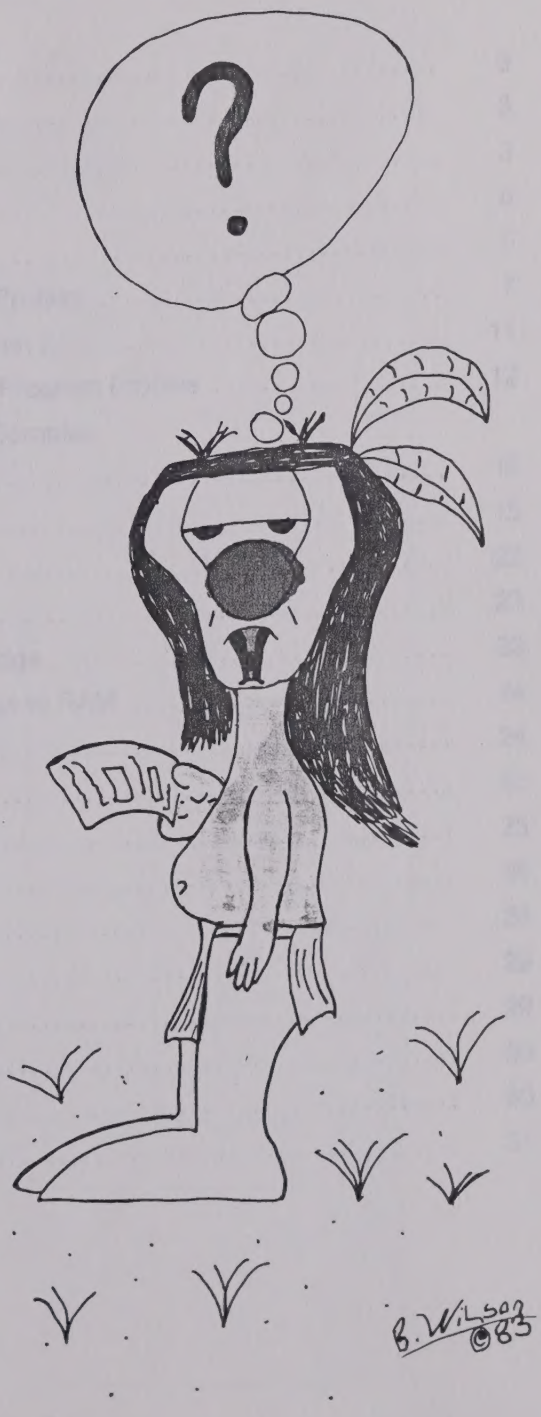
From Tenney about .....

MicroTenn® II

THE ***"I never programmed the Micro Tenn® II before"***
HANDBOOK



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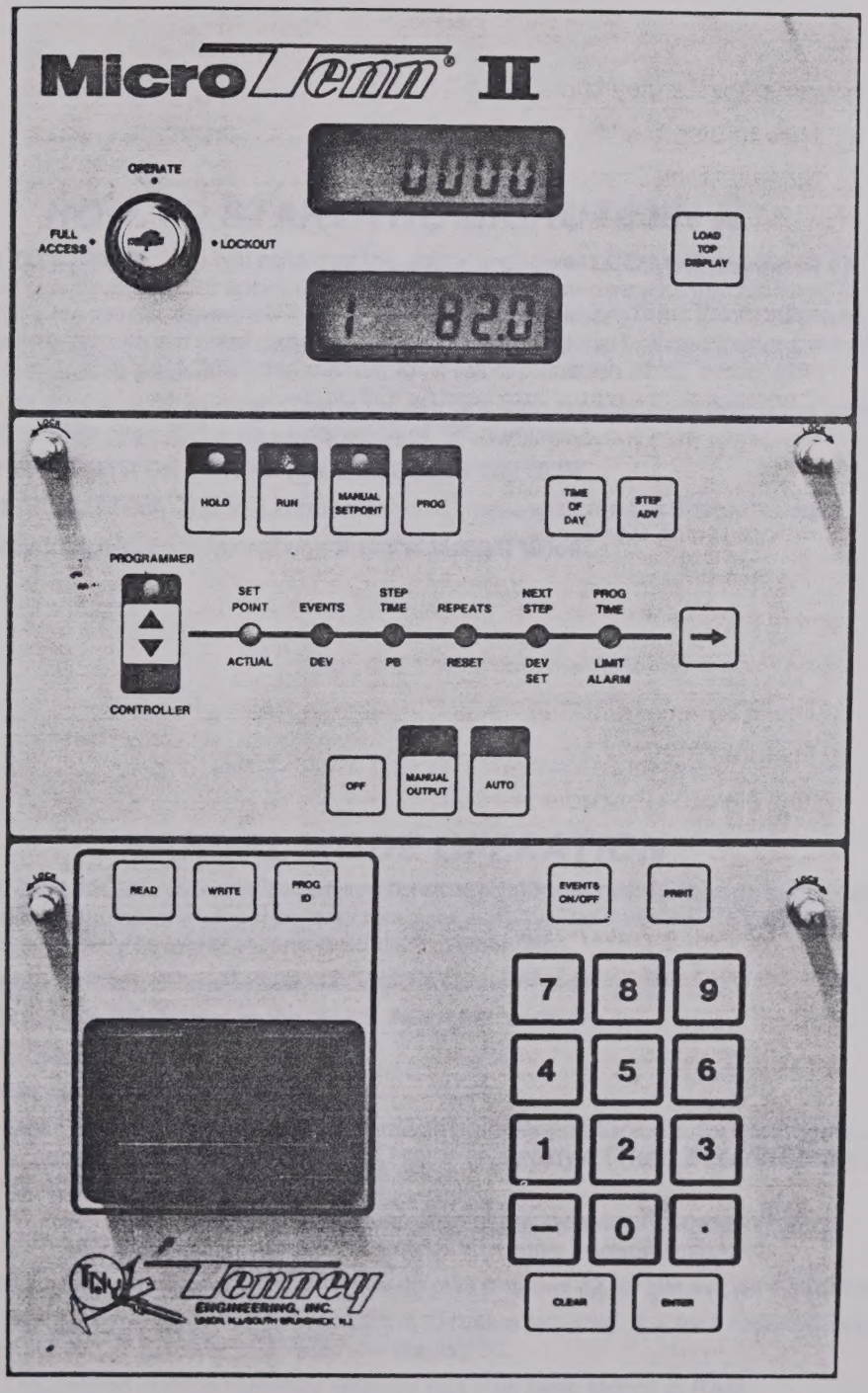
MicroTenn II
OPERATE
FULL ACCESS
LOCKOUT
LOAD TOP DISPLAY
HOLD
RUN
MANUAL SETPOINT
PROG
TIME OF DAY
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SET POINT
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CLEAR
ENTER
Tenney
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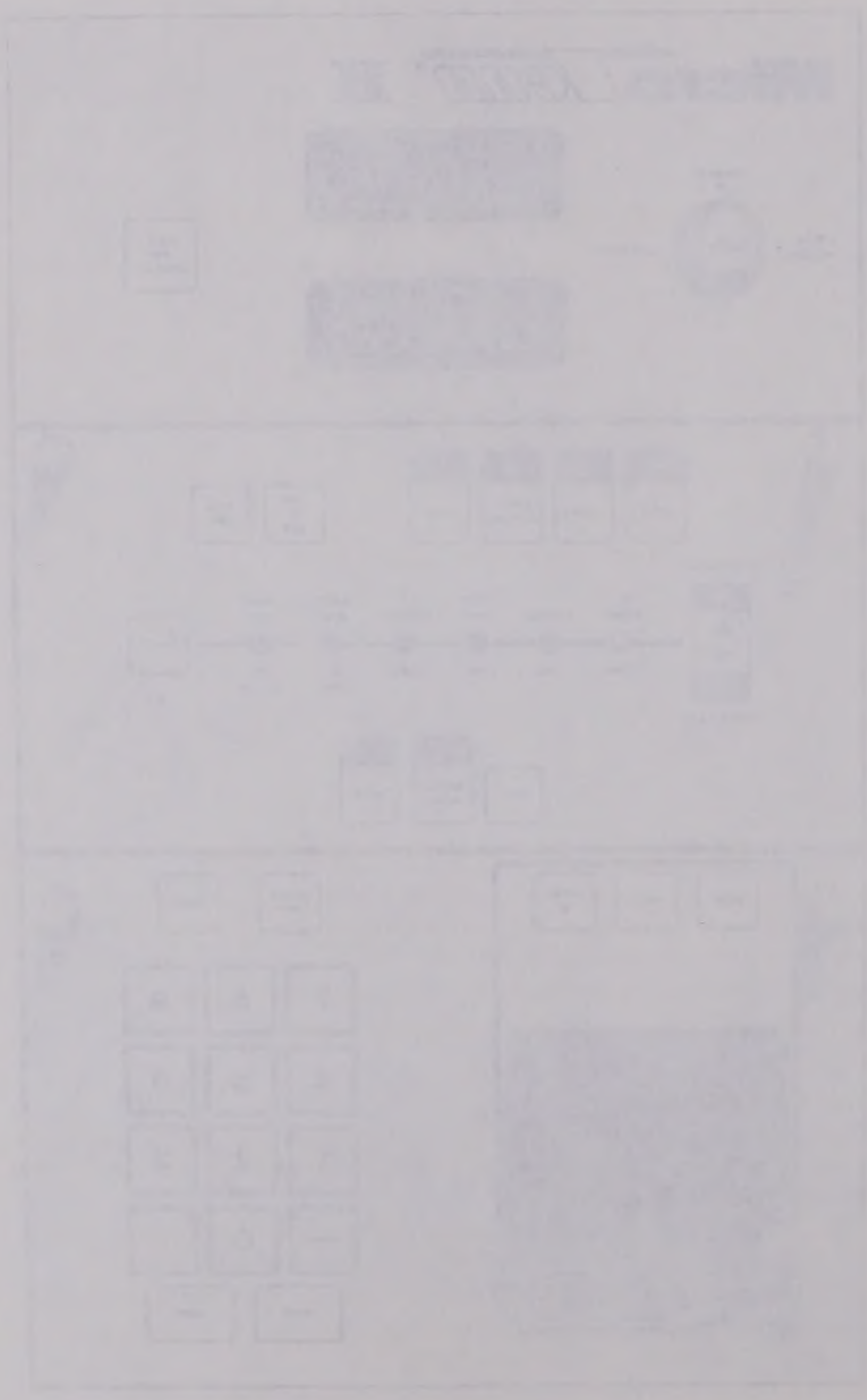


OPERATING THE TENNEY MICROTENN® II

The best way to learn to operate the MicroTenn II is through the hands on method. We suggest, therefore, that you familiarize yourself with the MicroTenn II operations described here. With this manual, and a live MicroTenn II, you should have very few problems in becoming proficient with this versatile programmer/ controller.

HOW TO START THE MICROTENN II

1. **APPLY POWER TO SYSTEM.** You will note that the upper and lower LCD's will display all 8's, and all of the LED's on the front panel will light for approximately 5 seconds. This allows you, the operator, to check out the displays and LED's for proper operation before proceeding. The MicroTenn II will now begin loading its software, and perform its own self diagnostic test. When the software has finished loading, the upper LCD will show an "E" message. (See page 30 of this manual for a full explanation of "E" messages.)

   The lower LCD will display a "P" number. This is the identification number assigned to the software for your particular chamber. (See page 30 for an explanation of "P" numbers.)
2. **TURN THE KEYLOCK SWITCH TO THE FULL ACCESS POSITION.**
3. **PRESS THE CLEAR BUTTON.** This will eliminate the "E" message from the upper display.

   You are now ready to operate the MicroTenn II in the **Manual Mode**.

MANUAL MODE OPERATION

To operate in the **MANUAL MODE,** you select a temperature setpoint in degrees C, then on temperature/humidity chambers, select a humidity setpoint in direct percent relative humidity. The chamber is then turned **"ON,"** and will ramp to these values as rapidly as possible, and hold them indefinitely.

The procedure for entering these setpoints and starting the chamber is as follows:

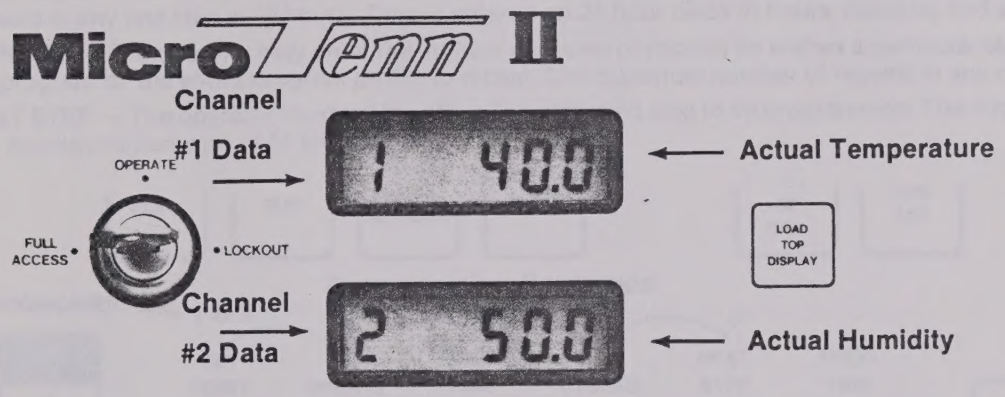
1. Make sure the **KEYLOCK SWITCH** is in the **"FULL ACCESS"** position.
2. Press the **"HOLD"** button.
3. Press the **"MANUAL SETPOINT"** button.
4. Press the proper digits on the number keyboard for the desired temperature (i.e. for a temperature setpoint of 40° C, press the "4" and then the "0"). The lower LCD will then display 40. Note: Be sure to press the minus (-) button before entering temperatures below 0° C.
5. Press the **"ENTER"** button. The desired temperature setpoint has now been stored in RAM.
   NOTE: Steps 6 thru 8 give information required to enter the relative humidity setpoints.
6. Press the **"ENTER"** button. The lower LCD will now display channel #2, or RH setpoint information.
7. Press the proper digits on the number keyboard for the RH value required (i.e. for a humidity setpoint of 50%, press the "5" then the "0"). The lower LCD will now display 50.
8. Press **"ENTER."** The desired relative humidity setpoint has now been stored in RAM.
9. You are now ready to apply power to the system. Press the **"AUTO"** button. The chamber should now turn **"ON"** and begin to ramp to the setpoints you entered. ***Make sure the circuit breakers for the chamber are "ON."***

The MicroTenn II can display ***Actual Chamber Temperature*** and ***Humidity*** values as follows:

1. Press the center of the **"PROGRAMMER/CONTROLLER"** button. The **LED** above the word **"CONTROLLER"** will now be **"ON."** The lower LCD now displays channel #1 data, the ***Actual Chamber Temperature.***
2. To display the actual chamber humidity, press the **"ENTER"** button. The lower LCD now displays channel #2 data, the actual chamber percent relative humidity. ***This feature applies to chambers with humidity systems.***

Both of the above listed values can be displayed simultaneously as follows:

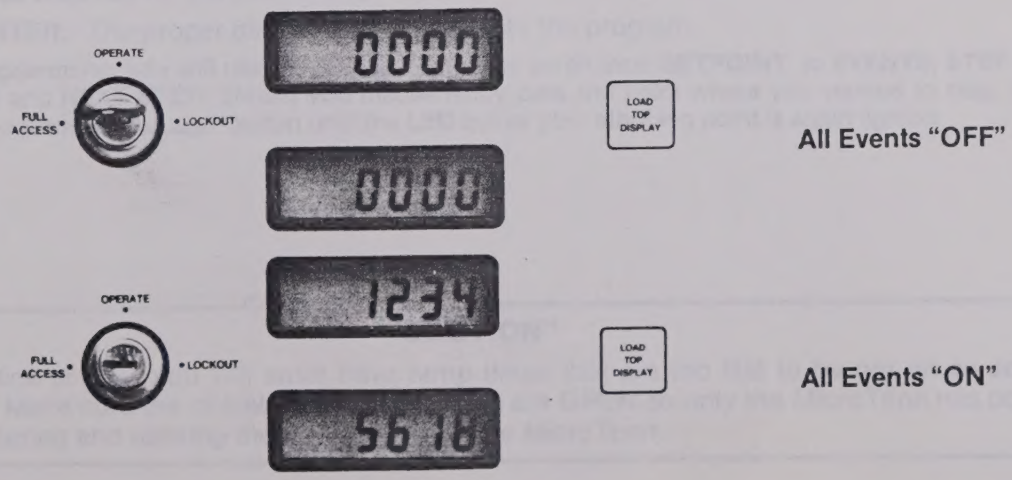
1. Press the **"LOAD TOP DISPLAY"** button. The upper and lower displays will now show the same data.
2. Press the **"ENTER"** button. The top display now shows one value, and the lower display will show the other. Remember a #1 in the far left of a display indicates channel #1 data, or ***Actual Temperature.*** A #2 in the far left indicates channel #2 data, ***Actual Relative Humidity.***



NOTE: In the manual mode of operation the operator, has the ability to energize as many as eight ***"EVENT TRIACS,"*** provided the chamber is equipped with this option. The procedure is as follows.

1. Press **"MANUAL SETPOINT"** button. Now press "⟶" once to **EVENTS.**
2. The upper and lower displays should show four 0's, starting in the upper display, the **EVENT** status for **EVENTS** 1 thru 4 is shown. The lower display shows the status of **EVENTS** 5 thru 8. A "0" indicates the **EVENT** is **"OFF,"** if any number between 1 and 8 is displayed that **EVENT** is **"ON."**
3. Press the digit on the keyboard corresponding to the **EVENT** you wish to energize. The "0" in the upper or lower display designated for that **EVENT** will begin to blink.
4. Press the **"EVENTS, ON/OFF"** button located just above the left side of the numerical keyboard. The **EVENT** number 1 thru 8 will now be displayed indicating that **EVENT** is energized.

NOTE: Event Triacs rated at 1 amp 120 or 230 V.A.C.

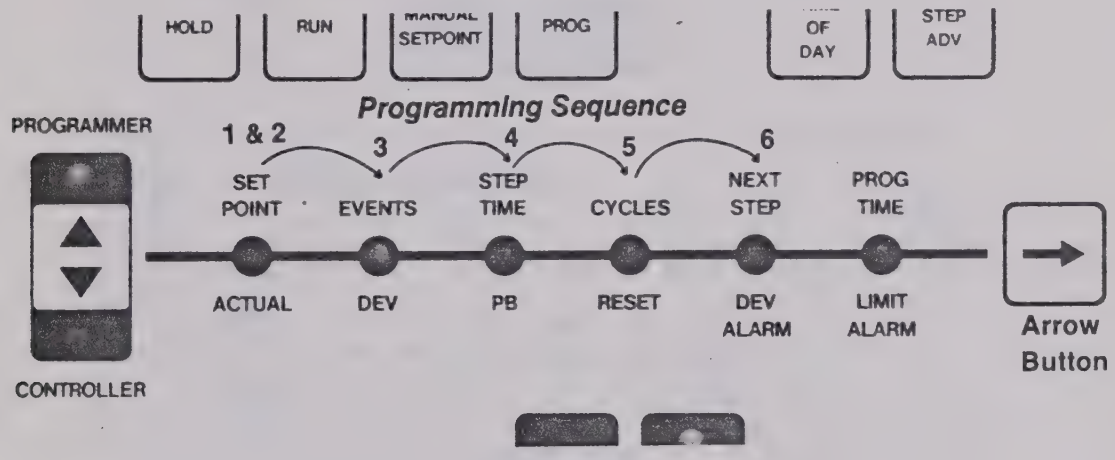


PROGRAMMING THE MICROTENN II

When programming the MicroTenn II, the required profiles are entered by Step number starting with Step #1.

Each step of the program profile may include part or all of the following data.

1. **TEMPERATURE SETPOINT** in degrees C. (-100° C to +200° C standard range) (-100° C to +500° C optional range)
2. **HUMIDITY SETPOINT** in percent RH (0-100%) on chambers with humidity capability.
3. **EVENTS** — The operator has the ability to energize up to eight (8) solid state relays in any step. These may be used to automatically turn power "**ON**" to the device under test, or other appropriate function. Note: The solid state relay board is optional equipment.
4. **STEP TIME** — The operator enters the required ramp time or hold time for each step. Note: The maximum time allowed in any one step is 18 hours. Time is entered on 24 hour clock in **hours, minutes,** and **seconds.**
5. **REPEATS** — The operator may enter the number of cycles or repeats he wishes a particular step number of the program or the entire program profile to repeat. The maximum number of repeats in any one step is 15.
6. **NEXT STEP** — The operator must tell the MicroTenn the next step to be programmed. The MicroTenn RAM can handle programs up to 51 steps.



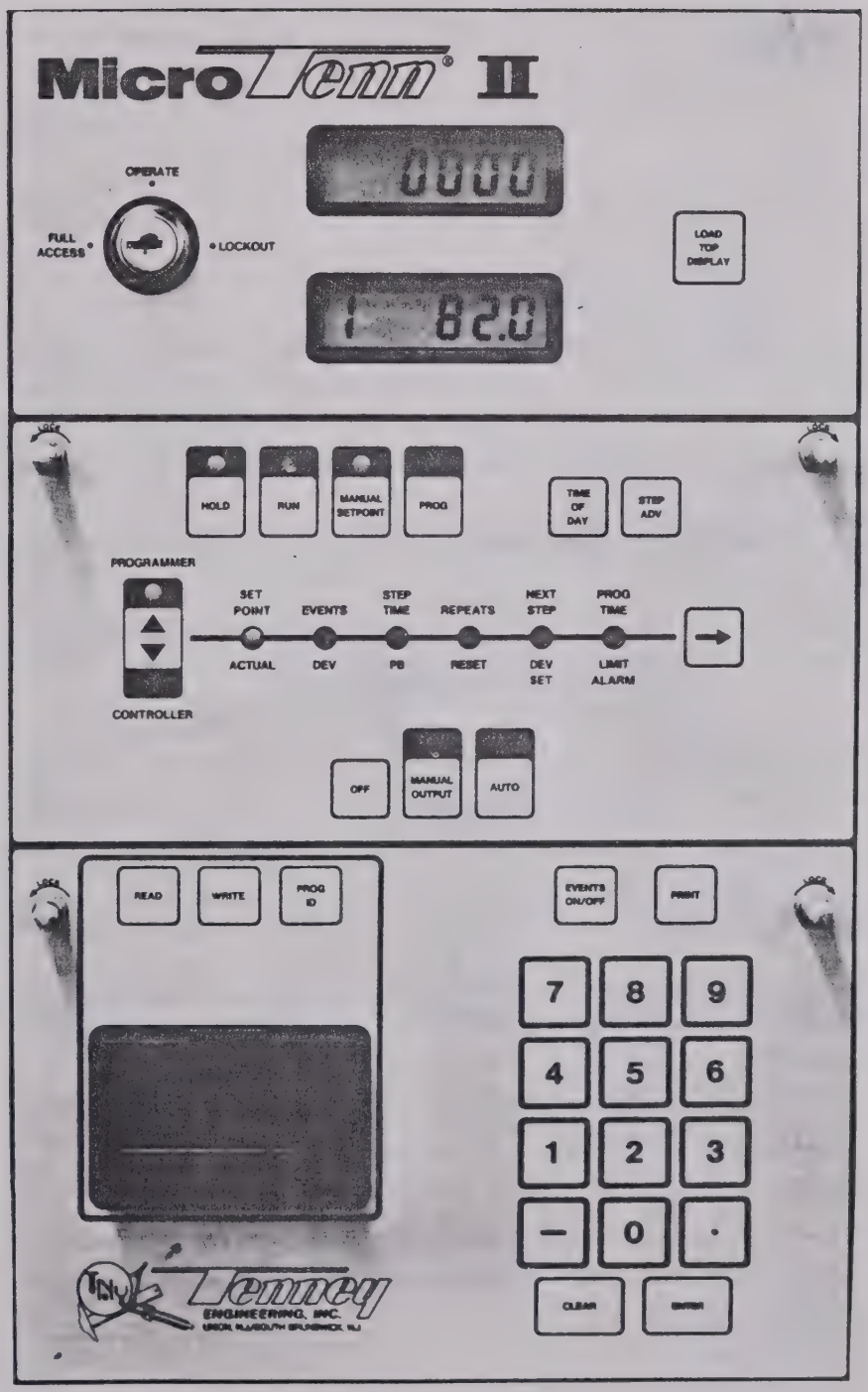
PROGRAMMING NOTE

When entering the following programs into the MicroTenn II, if you make a mistake and press the wrong digits all data may be corrected as follows:

1. Press the **"CLEAR"** button once.
2. Press digits required for the proper data.
3. Press **"ENTER."** The proper data is now entered into the program.
4. When programming, you will use the "⟶" button to scroll from **SETPOINT**, to **EVENTS, STEP TIME, REPEATS** and **NEXT STEP.** Should you inadvertently pass the point where you wanted to stop, simply continue to press the "⟶" button until the **LED** below your stopping point is again lighted.

"CAUTION"

The practice profiles you will enter have ramp times that are too fast to be run on an actual chamber. Make sure the chamber circuit breakers are **OPEN** so only the MicroTenn has power before entering and running these programs on the MicroTenn.


MicroTenn II
OPERATE
FULL ACCESS
LOCKOUT
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182.0
LOAD TOP DISPLAY
HOLD
RUN
MANUAL SETPOINT
PROG
TIME OF DAY
STEP ADV
PROGRAMMER
SET POINT
EVENTS
STEP TIME
REPEATS
NEXT STEP
PROG TIME
ACTUAL
DEV
PB
RESET
DEV SET
LIMIT ALARM
CONTROLLER
OFF
MANUAL OUTPUT
AUTO
READ
WRITE
PROG ID
EVENTS ON/OFF
PRINT
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8
9
4
5
6
1
2
3
–
0
.
CLEAR
ENTER
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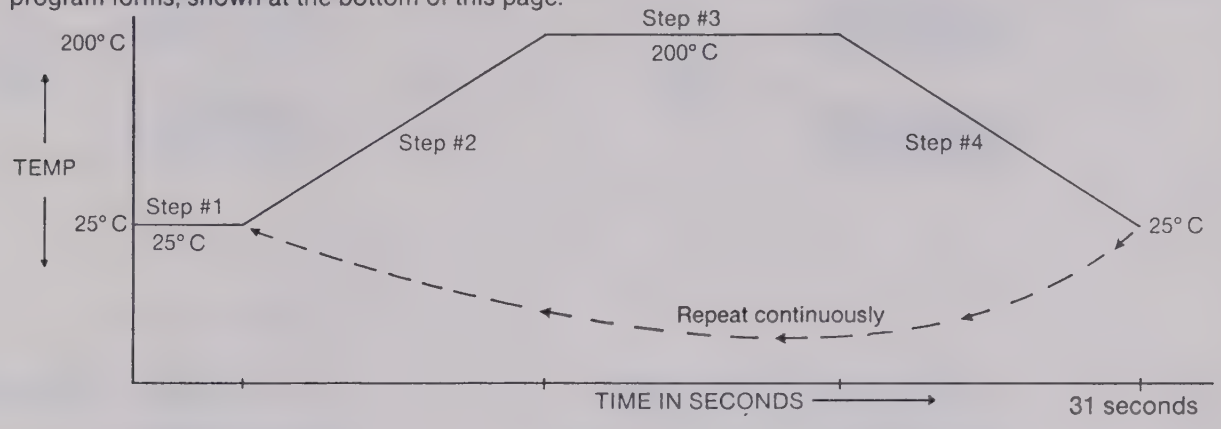
PROGRAMMING THE MICROTENN II TO PERFORM TEMPERATURE PROFILES

The procedure for programming the MicroTenn is to first draw out a time versus temperature profile, assigning step numbers to each ramp and hold of the profile as shown. This data is then entered on one of the MicroTenn program forms, shown at the bottom of this page.



In the practice profile shown above, the MicroTenn is to be programmed as follows:

Step #1 Start at 25° C and hold this temperature for 1 second.
Step #2 Ramp up to 200° C in 10 seconds.
Step #3 Hold 200° C for 10 seconds.
Step #4 Ramp back down to 25° C and repeat this program indefinitely.

TIP: The MicroTenn II uses membrane switches, ***PRESS EACH KEY FIRMLY,*** then watch for the proper system response.

See page 26 for **CONTROLLER SETTINGS** explanation.

MICROTENN II PROGRAM FORM

	HI-LOW LIMIT ALARMS HIGH	HI-LOW LIMIT ALARMS LOW	DEVIATION ALARM	PROPORTIONAL CHAN #1	BAND (PB) CHAN #2	RESET CHAN #1	RESET CHAN #2
CONTROLLER SETTINGS			± ____ °C				

(See Manual for explanation of these settings)

PROGRAM ID # ASSIGNED TO PROGRAM _____ ENTERED BY _____ DATE _____

Use the following format to enter data for all steps of your program profile. Starting with step #1 thru all 7 entries to next step.

1 ⟶ 2 ⟶ 3 ⟶ 4 ⟶ 5 ⟶ 6 ⟶ 7

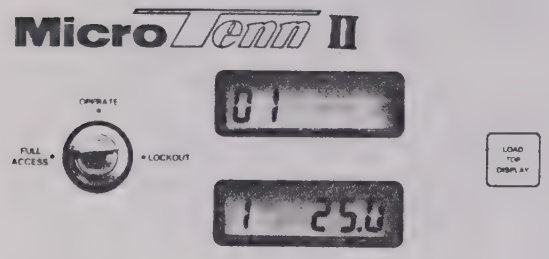
ENTER STEP # TO BE PROGRAMMED	ENTER CHAN. #1 TEMP SETPOINT IN °C	ENTER CHAN. #2 DATA IN % RH	ENTER EVENT # TO BE ON IN THIS STEP (1-8 EVENTS)	ENTER STEP TIME HRS: MIN: SEC 18 HRS MAX	ENTER # OF REPEATS REQ. MAX 15	ENTER THE STEP # FOR THE NEXT STEP TO BE PROG.
1	25°C	—	—	00:00:01	—	2
2	200°C	—	—	00:00:10	—	3
3	200°C	—	—	00:00:10	—	4
4	25°C	—	—	00:00:10	—	1

The above shows how to enter the temperature profile on one of the "MicroTenn Program Forms" provided in the back of this manual. We suggest that you learn to use these program forms to make programming the MicroTenn easier.

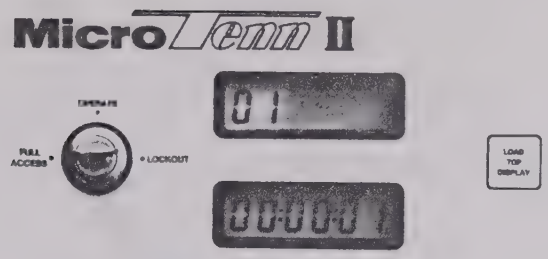
The following walk thru instructions will guide you in entering the above profile.

STEP #1

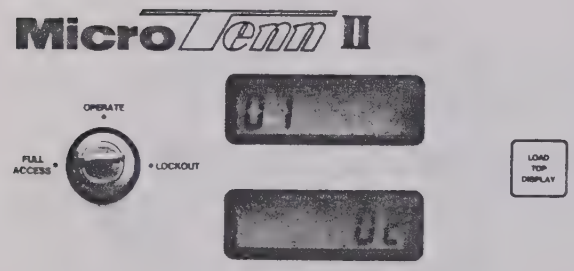
#1 TEMP SETPOINT



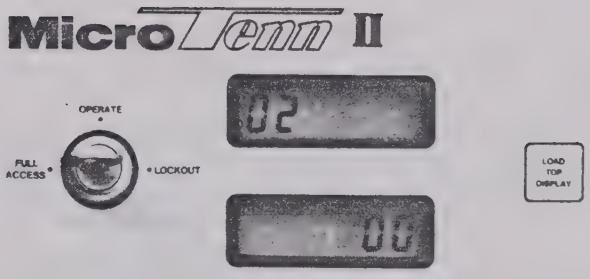
#2 STEP TIME



#3 NEXT STEP #

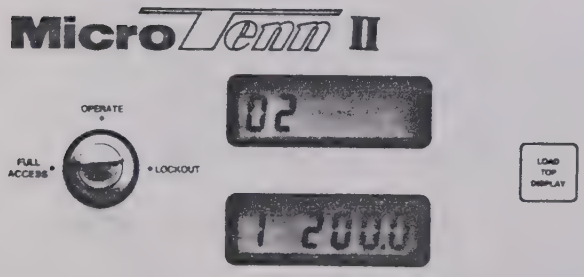


#4

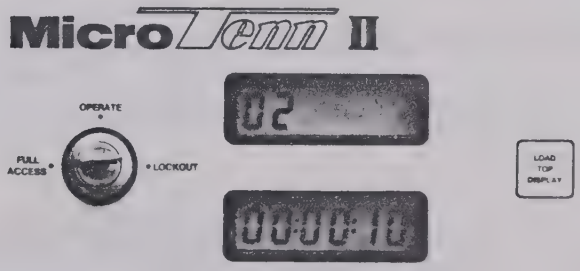


STEP #2

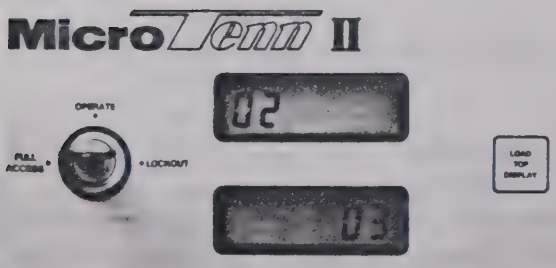
#5 TEMP SETPOINT



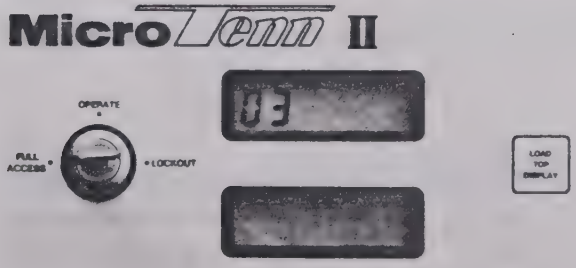
#6 STEP TIME



#7 NEXT STEP



#8



Refer to the MicroTenn Program Form and enter the program into the MicroTenn as follows:

Turn **KEYLOCK SWITCH** to the **FULL ACCESS** position.

Make sure the **"OFF"** button is pressed.

Press the **"HOLD"** button.

Press the **"PROG"** button. The upper display should now show a blinking 01. This is the MicroTenn's way of asking if you want to start programming at step #1 of your program profile.

Press the **"ENTER"** button. The 01 in the upper display should now stop blinking. You are now ready to start programming step #1 temperature setpoint data.

STEP #1 DATA ENTRY

STEP NUMBER	CHAN. 1 SETPOINT	CHAN. 2 SETPOINT	EVENTS	STEP TIME	REPEATS	NEXT STEP
1	25° C	—	—	00:00:01	—	2

1. Press the numbers "2" then "5" on the numerical keyboard.
2. Press the **"ENTER"** button. The temperature setpoint of 25° C for step #1 is now stored in RAM and displayed on the lower LCD. (See opposite page photo #1)

The next data to be programmed in step #1 of the sample profile is **STEP TIME.** Press the "⟶" button twice. The LED below the word **STEP TIME** should be lighted. The lower LCD displays a 24 hour clock. The first two "00's" going from left to right represent *hours,* the center two *minutes* and the last two *seconds.* The step time required in step #1 of the sample profile is 1 second, entered as follows:

3. Press the **"0"** button on the keyboard 5 times, then press the **"1"** button.
4. Press the **"ENTER"** button. The time of 1 second has now been entered into step #1. Displayed as 00:00:01. (See photo #2 opposite page)

The last data to be programmed in step #1 is the **NEXT STEP NUMBER,** which, in this case, is step number 2, entered as follows:

5. Press the "⟶" button twice. The LED below the words **NEXT STEP** should now be lighted.
6. Press the **"2"** button on the numerical keyboard.
7. Press the **"ENTER"** button. The 02 should now be displayed in the lower LCD. (See photo #3)
8. Press the **"STEP ADV"** button. The 02 will shift to the upper LCD.
9. Press the **"ENTER"** button. The 02 should now be displayed in the upper LCD indicating the MicroTenn is now ready to accept data for step #2 of the program profile. (See photo #4)
10. Press the "⟶" button. The LED below the words **"SETPOINT"** should now be lighted indicating the MicroTenn is ready to accept setpoint data for step #2.

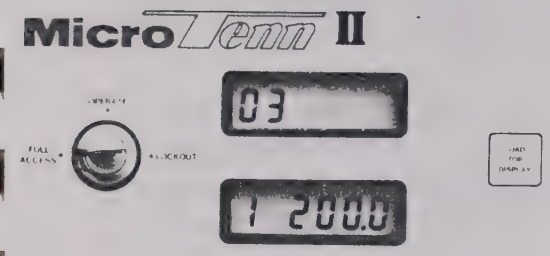
STEP #2 DATA ENTRY

STEP NUMBER	CHAN. 1 SETPOINT	CHAN. 2 SETPOINT	EVENTS	STEP TIME	REPEATS	NEXT STEP
2	200° C	—	—	00:00:10	—	3

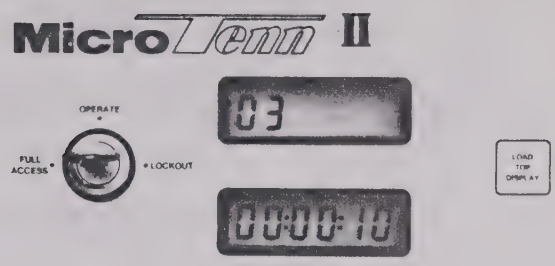
1. Press numbers corresponding to step #2 setpoint of 200° C. (See photo #5)
2. Press **"ENTER"**
3. Press "⟶" button twice to **STEP TIME.** Now press numbers corresponding to step #2 time of 10 seconds. (See photo #6)
4. Press **"ENTER"**
5. Press "⟶" button twice to **NEXT STEP**
6. Press the #3 on the numerical keyboard indicating you are ready to program step #3. (See photo #7)
7. Press the **"ENTER"** button
8. Press the **"STEP ADV"** button
9. Press the **"ENTER"** button (See photo #8)
10. Press the "⟶" button once, you are now ready to program step #3.

STEP #3

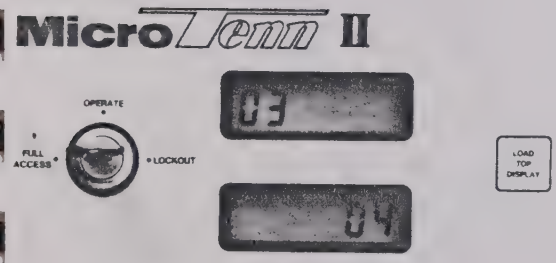
#1 TEMP SETPOINT



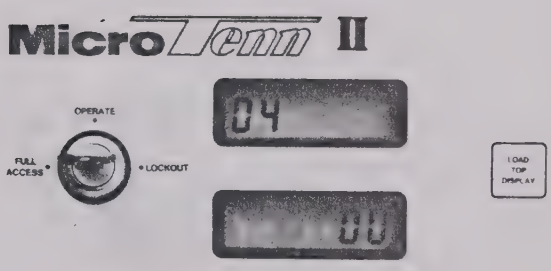
#2 STEP TIME



#3 NEXT STEP

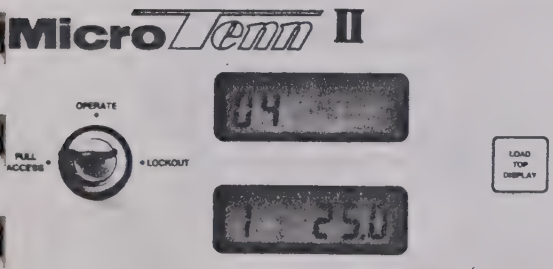


#4

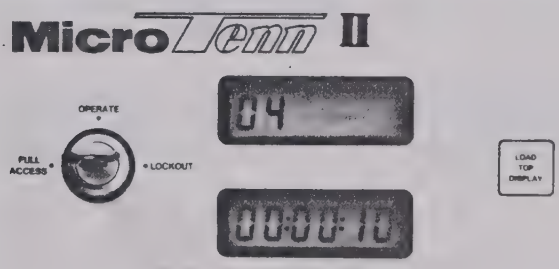


STEP #4

#5 TEMP SETPOINT



#6 STEP TIME



#7 NEXT STEP

STEP #3 DATA ENTRY

STEP NUMBER	CHAN. 1 SETPOINT	CHAN. 2 SETPOINT	EVENTS	STEP TIME	REPEATS	NEXT STEP
3	200° C	—	—	00:00:10	—	4

1. Press keyboard digits required for step #3 setpoint of 200 °C. (See photo #1 on opposite page)
2. Press **"ENTER"** button
3. Press the "⟶" button twice to **STEP TIME**
4. Press number digits required for **STEP TIME** of 10 seconds (See photo #2)
5. Press the **"ENTER"** button
6. Press the "⟶" button twice to enter **NEXT STEP**
7. Press **"4"** button on numerical keyboard (See photo #3 on opposite page)
8. Press **"ENTER"**
9. Press **"STEP ADV"**
10. Press **"ENTER"** (See photo #4)
11. Press "⟶" once, you are now ready to program step #4..

STEP #4 DATA ENTRY

STEP NUMBER	CHAN. 1 SETPOINT	CHAN. 2 SETPOINT	EVENTS	STEP TIME	REPEATS	NEXT STEP
4	25° C	—	—	00:00:10	—	1

1. Press # digits required for step #4 setpoint of 25° C. (See photo #5 on opposite page)
2. Press **"ENTER"**
3. Press "⟶" button twice to enter **STEP TIME**
4. Press # digits required for **STEP TIME** of 10 seconds. (See photo #6 on opposite page)
5. Press **"ENTER"** button
6. Press "⟶" button twice to enter **NEXT STEP.** Note at the end of step #4 the program calls for the system to loop back to the end of step #1 and repeat the profile continuously. To accomplish this, press the **"1"** button on the keyboard.
7. Press **"ENTER"** button. You have now programmed the MicroTenn to complete step #4 and then loop back to the **END** of step #1. The MicroTenn will always loop back to the end of the **NEXT STEP** number entered. If you had entered the #2 in the **NEXT STEP**, the MicroTenn would have tried to cycle back to the end of step #2. (See photo #7 on opposite page)

"CAUTION"

When using the **REPEATS** feature of the MicroTenn II, always cycle back to a step # of the same temperature, or temperature/humidity that was present at the end of the previous step of the program (end of step #4 of this profile and end of step #9 on the temperature/humidity profile that follows).

RUNNING THE SAMPLE PROFILE ON THE MICROTENN II

1. Press the **"RUN"** button. The lower display will now show a blinking number.
2. Press the **"1"** button on the numerical keyboard indicating you want to start running your program at step #1.
3. Press the **"ENTER"** button. The lower LCD display should immediately read 25° C then begin ramping up to 200° C in 10 seconds. It will hold 200° C for 10 seconds, then ramp back down to 25° C and repeat the program. If your program does not operate properly, the following procedure will assist you in quickly finding and correcting the problem. Note: When running an actual program in the chamber, you must press the **"AUTO"** button to start the chamber.

CHECK OUT PROCEDURE FOR MICROTENN II PROGRAM PROFILES

The following procedure will allow you to easily check out and correct your program profile.

Assuming you have entered the sample profile, use the MicroTenn Program Form shown below as follows:

Note: Starting on the left side of the form, all step #s 1 thru 4 are listed vertically. The setpoints, step time and next step instructions are also listed vertically. Using the following procedure, you will be able to scroll thru all 4 steps first checking ***Temperature Setpoints,*** then ***Step Times,*** and finally ***Next Step*** instructions, correcting them if necessary.

See page 26 for **CONTROLLER SETTINGS** explanation.

MICROTENN II PROGRAM FORM

	HI-LOW LIMIT ALARMS HIGH	HI-LOW LIMIT ALARMS LOW	DEVIATION ALARM	PROPORTIONAL CHAN #1	BAND (PB) CHAN #2	RESET CHAN #1	RESET CHAN #2
CONTROLLER SETTINGS			± ____ °C				

(See Manual for explanation of these settings)

PROGRAM ID # ASSIGNED TO PROGRAM _____ **ENTERED BY** _____ **DATE** _____

Use the following format to enter data for all steps of your program profile. Starting with step #1 thru all 7 entries to next step.

1 ⟶ 2 ⟶ 3 ⟶ 4 ⟶ 5 ⟶ 6 ⟶ 7

ENTER STEP # TO BE PROGRAMMED	ENTER CHAN. #1 TEMP SETPOINT IN °C	ENTER CHAN. #2 DATA IN % RH	ENTER EVENT # TO BE ON IN THIS STEP (1-8 EVENTS)	ENTER STEP TIME HRS: MIN: SEC 18 HRS MAX	ENTER # OF REPEATS REQ. MAX 15	ENTER THE STEP # FOR THE NEXT STEP TO BE PROG.
1	25°C	—	—	00:00:01	—	2
2	200°C	—	—	00:00:10	—	3
3	200°C	—	—	00:00:10	—	4
4	25°C	—	—	00:00:10	—	1

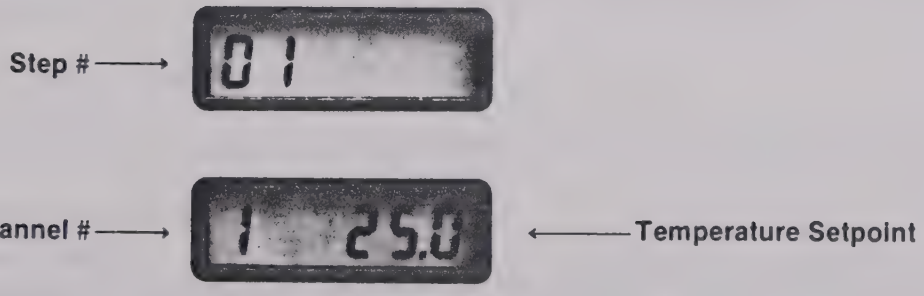
Turn key to **FULL ACCESS** position.

Press **"HOLD"** button.

Make sure **"OFF"** button is pressed.

Press **"PROG"**

Press **"ENTER"** button. The upper display will now show an 01, indicating you are looking at step #1 setpoint information. The lower display should now show 1 25.0 indicating a temperature setpoint of 25° C. (See photo below) If the 25.0 is not displayed you have an error in your program. ***To correct any error during this check out mode,*** simply press the required digits on the keyboard, then press the **"ENTER"** button. The proper data is now stored in the program.



You are now ready to check out the temperature setpoints for steps 2 thru 4.

1. Press the **"STEP ADV"** button.
2. Press **"ENTER."** The upper display now shows 02, indicating you are looking at step #2 information. The lower display should show 200.0. If not, correct as explained in step #1.

Step #3 Temperature Setpoint checkout.

1. Press **"STEP ADV"**
2. Press **"ENTER."** The upper display shows 03 and lower display shows a setpoint of 200°C. Correct, if necessary.

Step #4 Temperature Setpoint checkout.

1. Press **"STEP ADV."**
2. Press **"ENTER."** The upper display shows 04 and lower display shows a setpoint of 25°C. Correct if necessary.

You have now checked the temperature setpoints for all 4 steps of your program profile. The next item to check is **STEP TIME**, which is accomplished in the following manner.

1. Press **"PROG"** button.
2. Press **"ENTER."** You are now back to step #1 of your program profile.
3. Press " ⟶ " button twice. The LED below the words **STEP TIME** should be lighted. You are now ready to scroll thru steps 1-4 checking the times entered against the MicroTenn Program Form.

The lower LCD should show a step #1 time of 1 second displayed as follows: 00:00:01. If not, press the number keys required to give correct time, then press **"ENTER."**

Step #2 Time checkout.

1. Press **"STEP ADV."**
2. Press **"ENTER."** The lower display should show a time of 10 seconds, shown as 00:00:10. Correct, if necessary.

Step #3 Time checkout.

1. Press **"STEP ADV."**
2. Press **"ENTER."** The lower display should show a time of 10 seconds, shown as 00:00:10. Correct, if necessary.

Step #4 Time checkout.

1. Press **"STEP ADV."**
2. Press **"ENTER."** The lower display should again show a time of 10 seconds. Correct, if necessary.

You are now ready to check out the **NEXT STEP** instructions as follows:

1. Press **"PROG"** button.
2. Press **"ENTER"** button, you are now back to step #1 of the program profile.
3. Press " ⟶ " button 4 times until LED under the words **NEXT STEP** is lighted. The lower display should have an 02 displayed indicating that the next step instruction for step #1 is step #2. Correct, if necessary.

Step #2 NEXT STEP checkout.

1. Press **"STEP ADV."**
2. Press **"ENTER."** The number 03 should be displayed in the lower LCD. Correct, if necessary.

Step #3 NEXT STEP checkout.

1. Press **"STEP ADV."**
2. Press **"ENTER."** The number 04 should be displayed in the lower LCD. Correct, if necessary.

Step #4 NEXT STEP check out.

1. Press **"STEP ADV."**
2. Press **"ENTER."** The lower LCD should show an 01 indicating that after completing step #4, the program will loop back to the end of step #1 and repeat the profile continuously. Correct, if necessary.

NOTE

This check out procedure can be used to verify any program you may write into RAM memory. Remember, in more complex programs, you may also have to check out channel #2 setpoints, events, and repeats for all steps. The procedure for checking out and correcting these instructions is the same as explained above.

See page 26 for **CONTROLLER SETTINGS** explanation.

MICROTENN II PROGRAM FORM

	HI-LOW LIMIT ALARMS HIGH	HI-LOW LIMIT ALARMS LOW	DEVIATION ALARM	PROPORTIONAL CHAN #1	BAND (PB) CHAN #2	RESET CHAN #1	RESET CHAN #2
CONTROLLER SETTINGS			± ____ °C				

(See Manual for explanation of these settings)

PROGRAM ID # ASSIGNED TO PROGRAM _____ **ENTERED BY** _____ **DATE** _____

Use the following format to enter data for all steps of your program profile. Starting with step #1 thru all 7 entries to next step.

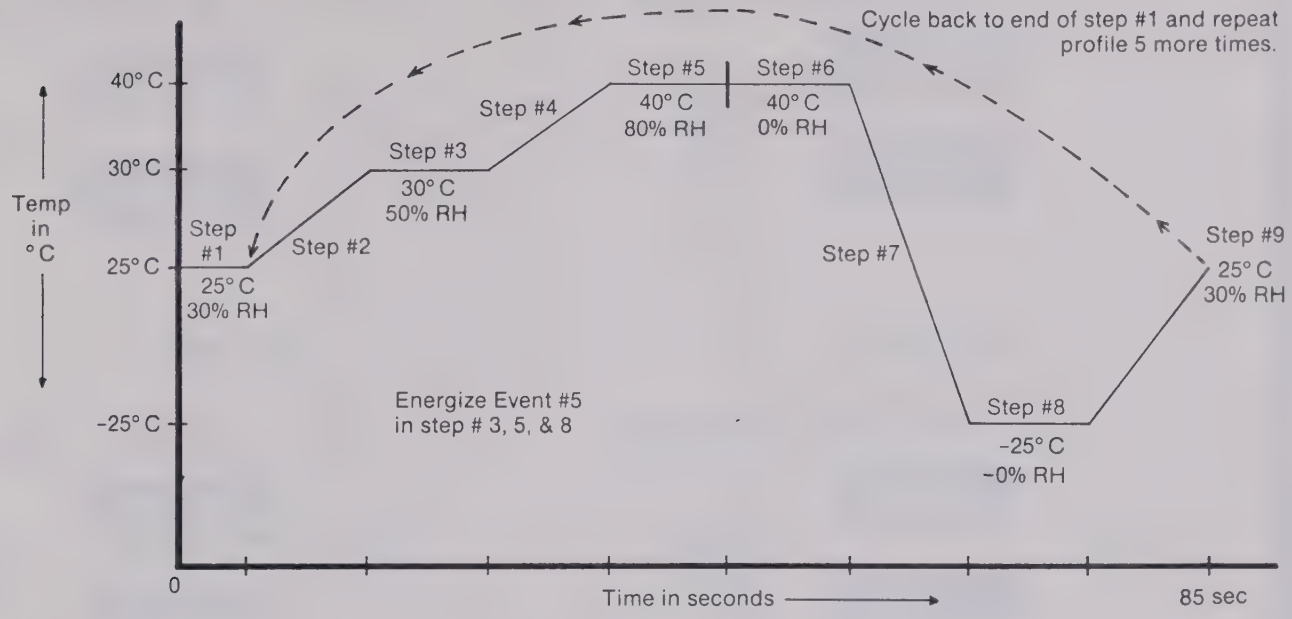
1 ⟶ 2 ⟶ 3 ⟶ 4 ⟶ 5 ⟶ 6 ⟶ 7

ENTER STEP # TO BE PROGRAMMED	ENTER CHAN. #1 TEMP SETPOINT IN °C	ENTER CHAN. #2 DATA IN % RH	ENTER EVENT # TO BE ON IN THIS STEP (1-8 EVENTS)	ENTER STEP TIME HRS: MIN: SEC 18 HRS MAX	ENTER # OF REPEATS REQ. MAX 15	ENTER THE STEP # FOR THE NEXT STEP TO BE PROG.
1	25° C	30% R H	—	00:00:05	—	2
2	30° C	50% R H	—	00:00:10	—	3
3	30° C	50% R H	5	00:00:10	—	4
4	40° C	80% R H	—	00:00:10	—	5
5	40° C	80% R H	5	00:00:10	—	6
6	40° C	0% R H	—	00:00:10	—	7
7	-25° C	-0% R H	—	00:00:10	—	8
8	-25° C	-0% R H	5	00:00:10	—	9
9	25° C	30% R H	—	00:00:10	5	1

The above shows how to use the MicroTenn Program Form for entering the temp/humidity profile shown on the opposite page.

PROGRAMMING THE MICROTENN II TO PERFORM COMPLEX TEMPERATURE/HUMIDITY PROFILES

Draw out a time vs temperature/humidity profile as shown. Number each ramp and hold with a step number and enter data on ***MicroTenn Program Form*** as shown on the opposite page.



In the practice profile shown above, the MicroTenn is to be programmed as follows:

Step #1 Stabilize at 25° C, 30% RH for 5 seconds.

Step #2 Ramp up to 30° C, 50% RH in 10 seconds.

Step #3 Hold 30° C, 50% RH for 10 seconds, and turn **"ON" "EVENT"** Triac #5.
Note: In this practice profile **"EVENT"** Triac #5 is set to turn **"ON"** a data recorder and then automatically record operating parameters from the device under test at step #3, 5, and 8.

Step #4 Ramp up to 40° C, 80% RH in 10 seconds.

Step #5 Hold 40° C, 80% RH for 10 seconds, and turn **"ON" "EVENT"** Triac #5.

Step #6 Hold 40° C while ramping humidity down to 0% in 10 seconds. Note: When ramping down to a low temperature (below 40° F) from a high humidity condition, always provide a step to ramp the humidity down before ramping the temperature down, (i.e. step #6). This will prevent the moisture from freezing on the chamber ambient cooling coils before it can be removed by the dehumidification system. (NOTE: On actual programs, the dehumidify step should take approximately 10 to 30 minutes, depending on the size of the chamber. Actual chamber humidity should be below 35% before ramp down begins.)

Step #7 Ramp down to -25° C and -0.0% RH (minus). Note: On a 2 channel MicroTenn, the logic circuits prevent the system from going into the full cooling mode, if any humidity value (even zero) is entered into channel #2 memory. **ALWAYS ENTER** a minus (-0.0%) humidity value into channel 2 when ramping to or holding temperatures below 20° C.

Step #8 Hold -25° C and -0.0% RH for 10 seconds, and turn **"ON" "EVENT"** Triac #5.

Step #9 Ramp up to 25° C, 30% RH and then immediately cycle back to the end of step #1 and repeat the profile an additional 5 times.

PROGRAMMING SEQUENCE

Place **KEYLOCK SWITCH** in **"FULL ACCESS"** position.

Make sure the **"OFF"** button is pressed.

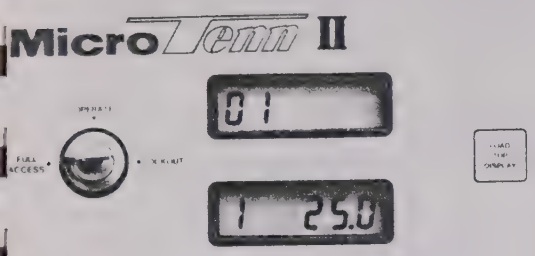
Press **"HOLD"** button.

Press the **"PROG."** The upper display should now show a blinking 01. This is the MicroTenn's way of asking you if you want to start programming at step #1 of the program profile.

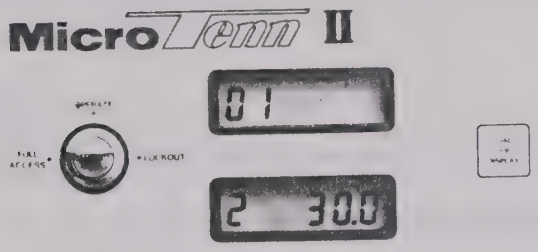
Press the **"ENTER"** button. The 01 should now stop blinking, and the MicroTenn is ready to accept the first step of your program profile.

STEP #1

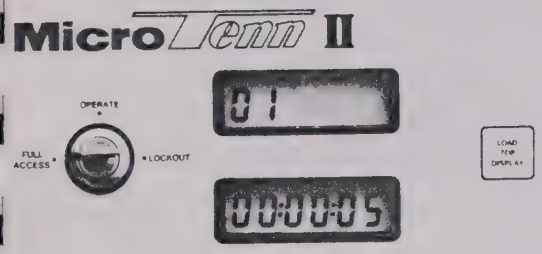
#1 TEMP SETPOINT



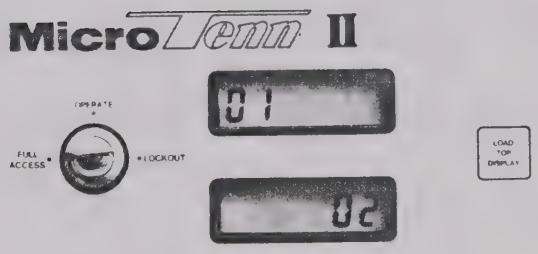
#2 HUMIDITY SETPOINT



3 STEP TIME

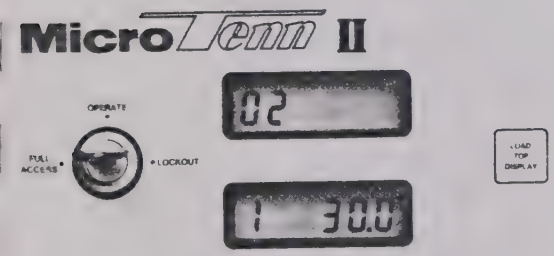


#4 NEXT STEP

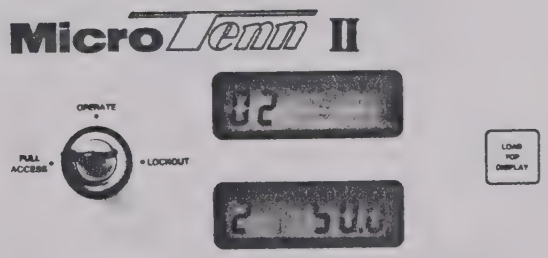


STEP #2

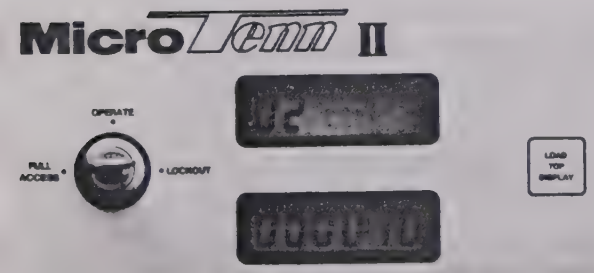
#5 TEMP SETPOINT



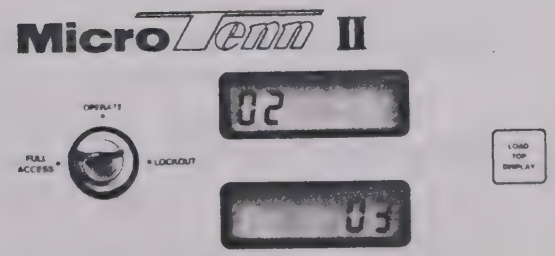
#6 HUMIDITY SETPOINT



#7 STEP TIME



#8 NEXT STEP



STEP #1 DATA ENTRY

STEP NUMBER	CHAN. 1 SETPOINT	CHAN. 2 SETPOINT	EVENTS	STEP TIME	REPEATS	NEXT STEP
1	25° C	30%	—	00:00:05	—	2

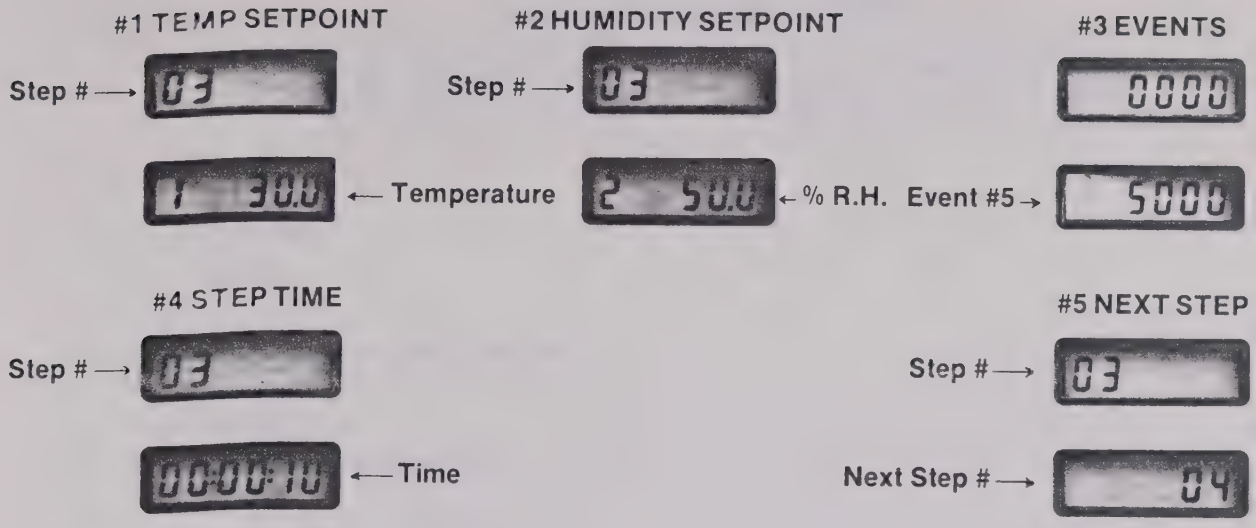
1. Press the digits **"2"** and **"5"** on the numerical keyboard.
2. Press **"ENTER"** button. The **Temperature Setpoint** of 25°C for step #1 has now been entered. (Photo #1 opposite page)
3. Press **"ENTER"** button again. The lower display now shows channel #2 or **%RH Setpoint Information.**
4. Press the digits **"3"** and **"0."**
5. Press the **"ENTER"** button. The **Humidity Setpoint** of 30% RH has now been entered. (Photo #2 opposite page)
6. Press the "→" button twice. The LED below the word **STEP TIME** should now be lighted.
7. Press digits on numerical keyboard required to give a time of 5 seconds, entered as 00:00:05.
8. Press **"ENTER"** button. The **Step Time** of 5 seconds for step #1 has now been entered. (Photo # 3)
9. Press "→" button twice. The LED below the words **NEXT STEP** should now be lighted.
10. Press the **"2"** digit on keyboard.
11. Press **"ENTER"** button. You have now programmed the MicroTenn to go on to step #2 after completing step #1. (Photo #4 opposite page)

STEP #2 DATA ENTRY

STEP NUMBER	CHAN. 1 SETPOINT	CHAN. 2 SETPOINT	EVENTS	STEP TIME	REPEATS	NEXT STEP
2	30° C	50%	—	00:00:10	—	3

1. Press **"STEP ADV"** button.
2. Press **"ENTER"** button.
3. Press "→" button. You are now ready to enter **Temperature Setpoint** information for step #2.
4. Press digits **"3"** and **"0."**
5. Press **"ENTER."** The **Temperature Setpoint** of 30°C has now been entered for step #2. (Photo #5)
6. Press **"ENTER"** again. You are now ready to enter **Humidity Setpoint** information.
7. Press digits **"5"** and **"0."**
8. Press **"ENTER."** The **Humidity Setpoint** of 50% RH has now been entered for step #2. (Photo #6)
9. Press "→" twice. The LED below the words **STEP TIME** should be lighted.
10. Press digits required to give time of 10 seconds entered as 00:00:10.
11. Press **"ENTER."** The time of 10 seconds is now entered for step #2. (Photo #7 opposite page)
12. Press "→" twice. The LED below the words **NEXT STEP** should now be lighted.
13. Press digit **"3."**
14. Press **"ENTER."** You are now ready to program step #3 of your profile. (Photo #8)

STEP #3



STEP #3 DATA ENTRY

STEP NUMBER	CHAN. 1 SETPOINT	CHAN. 2 SETPOINT	EVENTS	STEP TIME	REPEATS	NEXT STEP
3	30° C	50%	5	00:00:10	—	4

1. Press **"STEP ADV"** button.
2. Press **"ENTER"** button.
3. Press "→" button. You are now ready to enter **Temperature Setpoint** information for step #3.
4. Press digits corresponding to step #3 setpoint of 30°C.
5. Press **"ENTER."** **Temperature Setpoint** is now entered. (Photo #1 above)
6. Press **"ENTER"** again. System is ready to accept **%RH Setpoint** value.
7. Press digits required to enter step #3 RH setpoint value of 50%.
8. Press **"ENTER."** **RH Setpoint** data is stored. (Photo #2 above)
9. Press "→" button once. The LED below the word **"EVENT"** should be lighted.

Note: The program profile calls for event #5 to come **"ON"** at step #3, and take data. When event Triacs are programmed **"ON,"** they will come **"ON"** at the start of the step and go **"OFF"** at the end of that step. If an event Triac is programmed to stay on for the next step, the transfer is bumpless.

10. Press the **"5"** on keyboard.
11. Press the **"EVENTS, ON/OFF"** button, located just above the top left of numerical keyboard. The #5 should be displayed in the lower LCD. You have now programmed **"EVENT"** #5 **"ON"** for step #3. (Photo #3 above)

    Note: You may program up to 8 **EVENT** Triacs **"ON"** in any step. The status of **EVENT** Triacs 1 thru 4 is shown in the upper LCD. **EVENT** status of 5 thru 8 is shown in lower display. **"0"** indicates **"OFF"** condition. The numbers 1 thru 8 indicate that an **EVENT** is **"ON."**To turn an **EVENT "OFF"** press its ID# and then the **"EVENTS, ON/OFF"** button.
12. Press the "→" button once to **STEP TIME.**
13. Press digits corresponding to a time of 10 seconds. (Photo #4 above)
14. Press **"ENTER."**
15. Press "→" twice, to **NEXT STEP.**
16. Press **"4"** button on keyboard.
17. Press **"ENTER."** You are now ready to enter data for step #4. (Photo #5 above)

STEP #4 DATA ENTRY

STEP NUMBER	CHAN. 1 SETPOINT	CHAN. 2 SETPOINT	EVENTS	STEP TIME	REPEATS	NEXT STEP
4	40° C	80%	—	00:00:10	—	5

1. Press **"STEP ADV."**
2. Press **"ENTER."**
3. Press "⟶."
4. Press **"4"** and **"0," Temperature Setpoint.**
5. Press **"ENTER."**
6. Press **"ENTER"** again.
7. Press **"8"** and **"0," Humidity Setpoint.**
8. Press **"ENTER."**
9. Press "⟶" twice to **STEP TIME.**
10. Press digits required for time of 10 seconds.
11. Press **"ENTER."**
12. Press "⟶" twice to **NEXT STEP.**
13. Press **"5."**
14. Press **"ENTER."** You are now ready to enter data for step #5.

STEP #5 DATA ENTRY

STEP NUMBER	CHAN. 1 SETPOINT	CHAN. 2 SETPOINT	EVENTS	STEP TIME	REPEATS	NEXT STEP
5	40° C	80%	5	00:00:10	—	6

1. Press **"STEP ADV."**
2. Press **"ENTER."**
3. Press "⟶" once.
4. Press **"4"** and **"0," Temperature Setpoint.**
5. Press **"ENTER."**
6. Press **"ENTER"** again.
7. Press **"8"** and **"0," RH Setpoint."**
8. Press **"ENTER."**
9. Press "⟶" once to **EVENTS.**
10. Press **"5"** button to program **EVENT** Triac #5 **"ON,"** take data.
11. Press **"EVENTS, ON/OFF"** button.
12. Press "⟶" button once to **STEP TIME.**
13. Press digits for **STEP TIME** of 10 seconds.
14. Press **"ENTER."**
15. Press "⟶" twice, to **NEXT STEP.**
16. Press **"6."**
17. Press **"ENTER."** You are now ready to program step #6.

STEP #6 DATA ENTRY

STEP NUMBER	CHAN. 1 SETPOINT	CHAN. 2 SETPOINT	EVENTS	STEP TIME	REPEATS	NEXT STEP
6	40° C	0%	—	00:00:10	—	7

1. Press **"STEP ADV."**
2. Press **"ENTER."**
3. Press "⟶" once.
4. Press **"4"** and **"0," Temperature Setpoint.**
5. Press **"ENTER."**
6. Press **"ENTER"** again.
7. Press **"0," RH Setpoint** of 0% RH.
8. Press **"ENTER."**
9. Press "⟶" twice to **STEP TIME.**
10. Press digits required for **STEP TIME** of 10 seconds.
11. Press **"ENTER."**
12. Press "⟶" twice to **NEXT STEP.**
13. Press **"7," NEXT STEP.**
14. Press **"ENTER."** You are now ready to program step #7.

Step #7 DATA ENTRY

STEP NUMBER	CHAN. 1 SETPOINT	CHAN. 2 SETPOINT	EVENTS	STEP TIME	REPEATS	NEXT STEP
7	-25° C	-0%	—	00:00:10	—	8

1. Press **"STEP ADV."**
2. Press **"ENTER."**
3. Press "⟶" once.
4. Press **"-25"** (*minus*) temperature setpoint.
5. Press **"ENTER."**
6. Press **"ENTER"** again.
7. Press **"-0,"** -0% RH (remember when ramping down to low temperature always enter minus (-)0% RH for channel 2 setpoint.)
8. Press **"ENTER."** RH setpoint entered.
9. Press "⟶" twice to **STEP TIME.**
10. Press digits required for step time of 10 seconds.
11. Press **"ENTER."**
12. Press "⟶" twice to **NEXT STEP.**
13. Press **"8."**
14. Press **"ENTER."** You are now ready to program step #8.

STEP #8 DATA ENTRY

STEP NUMBER	CHAN. 1 SETPOINT	CHAN. 2 SETPOINT	EVENTS	STEP TIME	REPEATS	NEXT STEP
8	-25° C	-0%	5	00:00:10	—	9

1. Press **"STEP ADV."**
2. Press **"ENTER."**
3. Press "⟶" once.
4. Press **"-2"** and **"5"** (*minus*)25° C ***Temperature Setpoint.***
5. Press **"ENTER."**
6. Press **"ENTER"** again.
7. Press **"-0,"** (minus zero) ***%RH Setpoint.***
8. Press **"ENTER."**
9. Press "⟶" once to **EVENTS.**
10. Press **"5."**
11. Press **"EVENTS, ON/OFF". EVENT** Triac #5 is now programmed **"ON."**
12. Press "⟶" once.
13. Press digits corresponding to step time of 10 seconds.
14. Press **"ENTER."**
15. Press "⟶" twice.
16. Press **"9"** for **NEXT STEP** to be programmed.
17. Press **"ENTER."** You are now ready to program step #9.

STEP #9 DATA ENTRY

STEP NUMBER	CHAN. 1 SETPOINT	CHAN. 2 SETPOINT	EVENTS	STEP TIME	REPEATS	NEXT STEP
9	25° C	30%	—	00:00:10	5	1

1. Press **"STEP ADV."**
2. Press **"ENTER."**
3. Press "⟶" once.
4. Press **"2"** and **"5,"** for ***Temperature Setpoint*** of 25° C.
5. Press **"ENTER."**
6. Press **"ENTER"** again.
7. Press **"3"** and **"0"** for ***Humidity Setpoint.***
8. Press **"ENTER."**
9. Press "⟶" twice.
10. Press digits required for **STEP TIME** of 10 seconds.
11. Press **"ENTER."**
12. Press "⟶" once to **REPEATS**. In step #9, the MicroTenn Program calls for the MicroTenn to complete step #9, and then repeat the entire profile 5 times.
13. Press **"5"** on keyboard.
14. Press **"ENTER."** 5 **REPEATS** are now entered in RAM.
15. Press "⟶" once to **NEXT STEP.** The MicroTenn program calls for the program to loop back to step #1.
16. Press **"1"** on keyboard.
17. Press **"ENTER."** The MicroTenn is now programmed to complete step #9, and then loop back to the **END** of step #1 and repeat the profile 5 times.

TEST RUN

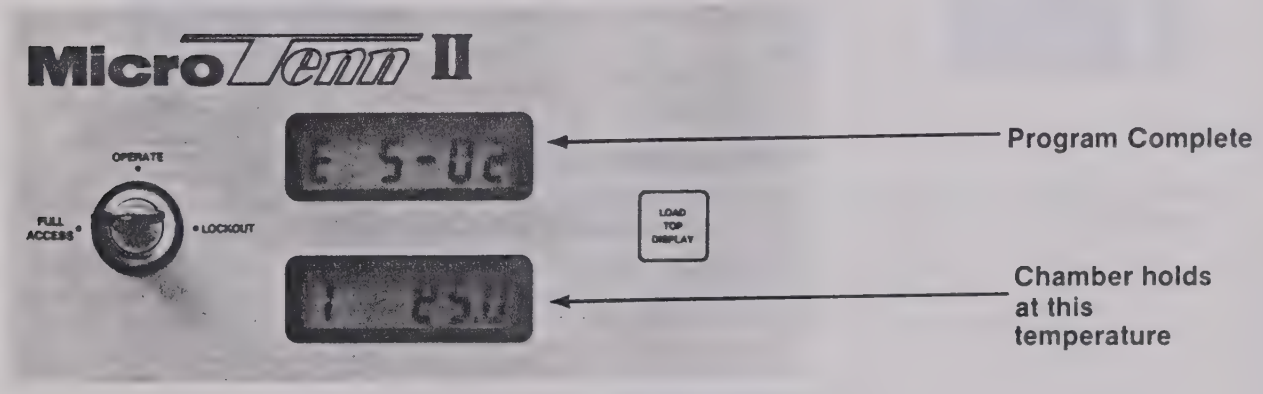
You are now ready to test run your temperature/humidity profile on the MicroTenn as follows:

1. **KEYLOCK SWITCH** in **FULL ACCESS** position.
2. Press **"HOLD"** button.
3. Press **"OFF"** button.
4. Press **"RUN"** button. Lower display should show some blinking number.
5. Press **"1"** on keyboard indicating you want to start your program on step #1.
6. Press **"ENTER."** Your program should now start to run. Note: When running an actual program in the chamber, you must press the **"AUTO"** button to start the chamber.
7. Press **"LOAD TOP DISPLAY."**
8. Press **"ENTER."** You can now monitor the ***Temperature Setpoints*** in the top LCD and ***Humidity*** setpoints in the lower display. This display of *temperature* and *humidity* should follow the program as described on page 14. If your program does not follow the profile properly, refer back to page 12. **CHECK OUT PROCEDURE FOR MICROTENNN PROFILES.** Be sure you check channel #2 **HUMIDITY SETPOINTS, EVENT STATUS,** and **REPEATS** when troubleshooting this program.

   After your program has completed 6 loops (1 loop + 5 repeats), an **"E"** message, E5-02 (illegal next point number encountered) will appear in the upper display. This **"E"** message indicates your program profile is complete and the MicroTenn has no next step programmed.

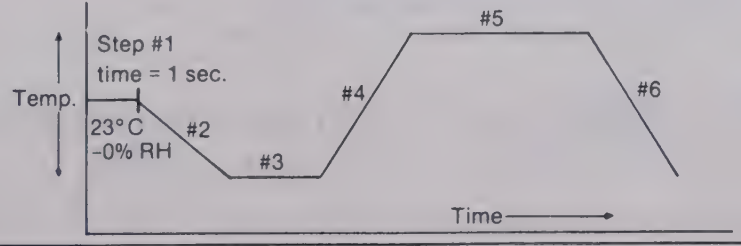
   The actual chamber conditions will hold at the values of the last step programmed (step #9) or 25° C and 30% RH.

   When programming the MicroTenn, **ALWAYS** provide a last step in your program to ramp the chamber back to the **AMBIENT HOLD** conditions you require.



PROGRAMMING TIP #1

When entering your own profiles into the MicroTenn, **"ALWAYS"** put in a first step of 1 sec, with a temp setpoint of 23° C, and a humidity setpoint of -0% RH. This will ensure all memory circuits are reset to ambient conditions. Failure to do this can result in excessive cycling of refrigeration and heating circuits. (See below)



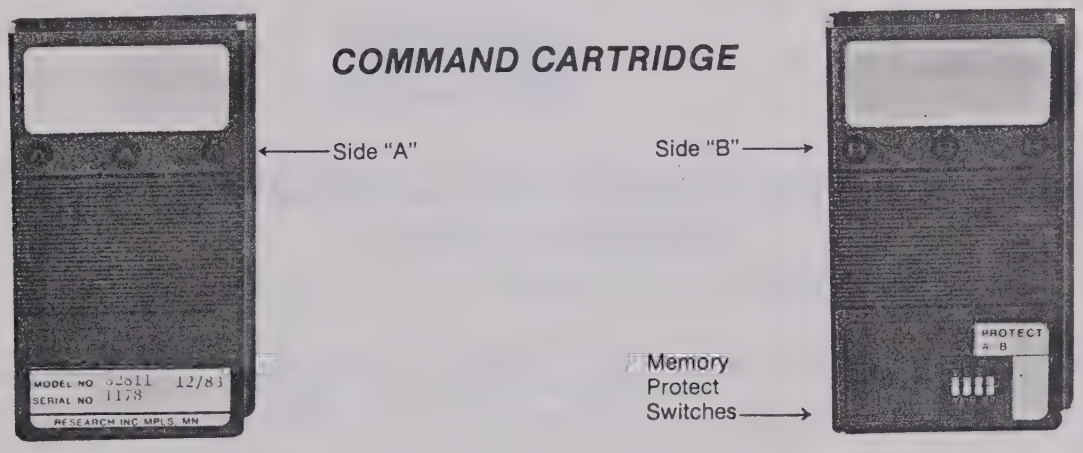
PROGRAM STORAGE

MicroTenn II programs may be stored for future use in the Command Cartridge (see photo). The Command Cartridge is capable of storing a total of 6, 51 step programs, (3 per side) in EEPROM memory. The built-in lithium battery maintains programs for up to 5 years.

In addition to the program profiles, the operator may also store the following additional information for each individual program.

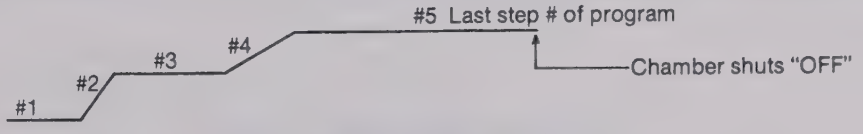
1. **PB** — Proportional band information for the temperature and humidity controllers. (See page 26 for explanation)
2. **Reset Values** — For the temperature/humidity controllers. (See page 26 for explanation)
3. **Deviation Setpoint** — Operator may program maximum ± allowable temperature deviation from setpoint for each program. This feature can be used to automatically ring an alarm or control a guaranteed soak time. (See page 26 for explanation)
4. **HI/Low Limit Alarm** — Operator may store maximum hi and low safe temperature limits for each individual program in the Command Cartridge. (See page 27 for explanation)

Once programs are stored on the Command Cartridge, they can be protected from accidental erasure or modification via the "Write/Protect" switches. (See photo)



PROGRAMMING TIP #2

The MicroTenn II can be programmed to automatically turn the chamber **"OFF."** The procedure is as follows. In the last step of your program profile when you get to the next step mode, enter the same # as the last step of your program.



STEP #5 DATA ENTRY

STEP NUMBER	CHAN. 1 SETPOINT	CHAN. 2 SETPOINT	EVENTS	STEP TIME	REPEATS	NEXT STEP
5	40° C	80%	—	10:00:00	0	5

No Repeats Allowed

This entry will turn the chamber "OFF" at the end of step #5

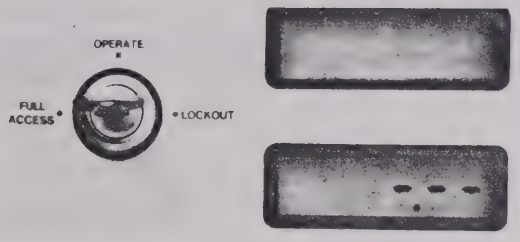
NOTE: In order for the MicroTenn to automatically turn the chamber **"OFF"** you must not have any repeats in the last step of your program. If the profile requires a repeat in the last step, and you still wish to turn the system off automatically, simply add an additional step to your profile with a step time of 00:00:00.

WRITING PROGRAMS INTO THE COMMAND CARTRIDGE

Once you have written a program into RAM memory and checked it out, you are ready to load the program into the Command Cartridge for future use.

1. Make sure the **"OFF"** button is pressed and the **KEYLOCK SWITCH** is in the **"FULL ACCESS"** position.
2. Insert the Command Cartridge into the MicroTenn II with either side "A" or "B" up. (See photo above).

3. Press the **"HOLD"** button.
4. Press the **"WRITE"** button. The lower LCD will now display three (3) blinking bars (-.- -). This is the MicroTenn's way of asking you to assign a 3 digit identification number to your program profile. You may assign any 3 digit number to your profile from 001 thru 999.
5. Press digits **123** assigning this ID number to your program profile.
6. Press **"ENTER"** button, your program is now being loaded into the Command Cartridge. This procedure takes only a few seconds. The load is complete when the 3 blinking bars again appear in the lower display.
7. **PROGRAM CHECK OUT.** To ensure your profile has indeed been stored, press the **"PROG/ID"** button. The first program ID number stored in memory will be shown in the lower display. Note: Each side of the Command Cartridge can store up to **THREE** 51-step programs.
8. Press the **"ENTER"** button repeatedly. The lower LCD will now display all the program profiles stored on this side of the cartridge. If only one program is stored in memory, that ID number will continuously be displayed in the lower LCD.



Assign a 3 digit I.D. # to your program profile

LOADING PROGRAMS FROM COMMAND CARTRIDGE TO RAM MEMORY

1. Make sure **KEYLOCK SWITCH** is in the **FULL ACCESS** position, and the **"OFF"** button is pressed.
2. Press **"HOLD"** button.
3. Press **"PROG ID"** button. The lower LCD will display the ID number of the first program stored on the tape. Note: An **EPL** display indicates **EMPTY PROGRAM LIBRARY**.
4. Press the **"ENTER"** button repeatedly until the program ID number you wish to use is displayed in the lower LCD.
5. Press the **"READ"** button. The lower LCD will show 3 blinking bars. This is the MicroTenn's way of asking you which program ID number you wish to read from the Command Cartridge.
6. Press digits corresponding to program ID number you wish to read.
7. Press **"ENTER"** button. The system will now load the program. This procedure takes only seconds. The load is complete when the 3 flashing bars again appear in the lower LCD.

You are now ready to run the program on the chamber as follows:

1. Make sure the chamber circuit breakers are turned **"ON."**
2. Press the **"RUN"** button. Blinking numbers will appear in the lower display.
3. Press the **"1"** on the keyboard. This tells the MicroTenn that you want to start your program at step #1.
4. Press **"ENTER."** The program will now start to run.
5. Press the **"AUTO"** button. The chamber will now turn **"ON"** and begin tracking the program profile.

KEY FEATURE

While your program is running, you can easily monitor the time into the step and the total program running time as follows:

1. Check the **"PROGRAMMER/CONTROLLER"** button to make sure you are in the **PROGRAMMER MODE.** If not, press the center of the **"PROGRAMMER/CONTROLLER"** button so that the LED below the word **PROGRAMMER** is **"ON."**
2. Press "→" button twice to **STEP TIME.** The upper display will now show the step number. The lower display will show the time into the step.
3. Press "→" button 3 times to **"PROG TIME."** The upper display will now show what step you are in. The bottom display will show the total time the program has been running.

PROGRAM DELETION PROCEDURES

To delete programs from the Command Cartridge, use the following procedure.

1. Press **"HOLD"** button.
2. Press **"OFF"** button.
3. Press **"PROG ID"** button. The first **PROG ID NUMBER** will appear in the lower display.
4. Press **"ENTER"** repeatedly until program ID number you wish to delete appears in the display.
5. Press **MINUS** ("-") button. This function keys the particular program for deletion. The **PROG #** will now begin to blink.
6. Repeat steps 4 and 5 as required to identify each program you wish to delete.
7. Press **"WRITE"** button.
8. The lower display will show " ---".
9. Press **"ENTER."** The system will now delete the program(s) selected from the Command Cartridge.
10. Press **"PROG ID"** button. Now verify that you have deleted the appropriate programs by repeatedly pressing the **"ENTER"** button. The deleted program ID numbers should no longer be displayed in the lower LCD.

MICROTENN II CLOCK FUNCTIONS

The MicroTenn has its own internal crystal controlled 24 hour clock, with an accuracy of .005% as its time base. This clock feature may also be used to perform an automatic time of day program start.

SETTING CLOCK TIME.

1. Press **"TIME OF DAY"** button. The lower LCD will now display some military time.
2. Press **DIGITS** required to give accurate time of day in military time.
3. Press **"ENTER"** button. Time of day is now stored.

AUTOMATIC TIME OF DAY (TOD) START

1. Make sure **KEYLOCK SWITCH** is in **FULL ACCESS** position.
2. Press **"OFF"** button.
3. Press **"HOLD"** button.
4. Load your program into RAM, either from the keyboard or from the Command Cartridge.
5. Press **"TOD"** button until "00:00:00" or a previously set start time appears in the lower display.
6. Press digits required to enter the time of day you wish your program to start.
7. Press **"ENTER."**
8. Press **"ENTER"** again.
9. Press **"1,"** indicating you want to start your program at step #1. Note that you can start your program at any step number you wish, providing you enter that step number at this time.
10. Press **"ENTER"**
11. Press **"RUN"** button.
12. Press "00" on keyboard.
13. Press **"ENTER"**

Now, when the time of day start point is reached, the **"HOLD"** LED will turn off and the **"RUN"** LED will come on. *MAKE SURE THE CHAMBER HAS POWER APPLIED AND ALL CIRCUIT BREAKERS ARE CLOSED.*

MICROTENN II CONTROLLER MODE OPERATION

The MicroTenn is more than just a Programmer, it is also a Controller. In the Controller Mode, you, the operator, will be able to monitor actual **TEMPERATURE** in the chamber, and also direct percent **RH** in chambers equipped with a humidity system.

You may also monitor **DEVIATION** from **SETPOINT** for both **TEMPERATURE** and **HUMIDITY.** You may monitor and modify the **PROPORTIONAL BAND (PB)** and **RESET** values for the two mode temperature and humidity controllers. You can program in an allowable **DEVIATION** from **TEMPERATURE SETPOINT,** and allowable **HIGH** and **LOW** safety setpoints, which will shutdown the chamber automatically if these preset values are exceeded.

To operate the MicroTenn in the **"CONTROLLER MODE,"** press the center of the **PROGRAMMER/ CONTROLLER** button so that the LED above the word **"CONTROLLER"** is **"ON."**

1. **MONITORING THE ACTUAL TEMPERATURE.** As soon as the MicroTenn is placed in the **"CONTROLLER"** mode, the actual chamber temperature is displayed in the lower LCD.

2. **MONITORING ACTUAL HUMIDITY.** Press the **"ENTER"** button once. The lower display will now show channel #2 actual chamber humidity data. Note: Channel 2 data available only on chambers equipped with humidity system.

3. **MONITORING DEVIATION FROM SETPOINT.** Press "⟶" button once. The LED above the word **DEV** should now be lighted. The lower display will now indicate deviation from setpoint for channel 2. To monitor channel #1 deviation from setpoint, press **"ENTER"** once.

4. **MONITORING PROPORTIONAL BAND SETTINGS (PB).** Press "⟶" once. The LED above **PB** should be lighted. The lower LCD will now display the channel #1 or #2 with numbers indicating how wide the proportional band is set. A typical setting for channel #1 would be 2.0, indicating the controller for channel #1 has a proportional band setting of 2%. A typical **PB** setting for channel #2 can range from 25% to 50%. These proportional band settings are loaded on the system software at the factory and, under normal operating conditions, do not need to be modified in the field. (See Chamber Operating Manual supplied with your chamber for adjustment procedures.)

5. **MONITORING RESET VALUES.** Press "⟶" button once. The lower LCD will now show the #1 or #2 followed by some number. This second number is the **"RESET"** value programmed in at the factory for your particular chamber. Again, by pressing the **"ENTER"** button, the system will toggle between channel #1 and channel #2 reset values. Typical reset values for channel #1 range from .1 to .3. Channel #2 reset values range from .05 to .5. Your MicroTenn equipped chamber is supplied with a data sheet that tells you what values of **PB** and **RESET** were originally entered at the factory. (See Chamber Operating Manual supplied with your chamber for adjustment procedures.)

6. **MONITORING DEVIATION SET.** Press the "⟶" once. The LED below the word **DEV SET** should be lighted. The lower LCD will show some number, usually 300. This number indicates how far, in degrees C, the actual chamber temperature can deviate from the program setpoint before the deviation triac is energized. The deviation triac is triac #2, located on the temperature control board behind the MicroTenn control panel (see page 28). This triac can be wired by the operator to ring a bell, shut down the test, or perform another function, if the temperature deviation exceeds the preset value. The allowable deviation can be programmed by the operator to be as wide as ±300° C or as narrow as ±1° C.

   (NOTE: Triac rated for 1 amp at 120 or 230 VAC.)

   To program the allowable deviation of ±5° C, simply press the **"5"** on the keyboard and then the **"ENTER"** button. The deviation relay will now energize, if the actual temperature in the chamber is above or below the programmed setpoint by more than 5° C.

   NOTE: **DEV SET** can be used to perform a guaranteed soak function through a switch selection at the back of the MicroTenn II. See page 27 for full details.

7. **MONITORING THE LIMIT ALARM.** The MicroTenn has an adjustable **HI-Low** back-up limit alarm system. In the event the main temperature controller should fail, and these limit alarm values are exceeded, the chamber will automatically shut off, activating both audio and visual alarms.

   The procedure to modify the **LIMIT ALARM** is as follows:

   1. Press the "⟶" button once, the LED below the words **LIMIT ALARM** should be lighted. The lower LCD will show the letter "H" followed by some value. This is the preset **HIGH LIMIT** programmed at the factory. To change this value press the number digits on the keyboard required to give you the **HIGH LIMIT VALUE** you want for your program.
   2. Press **"ENTER."** This new high limit value is now stored in RAM memory.
   3. Press **"ENTER"** again. The lower LCD will now display the letter **"L"** and the factory preset value for the **LOW LIMIT ALARM.**
   4. Press the number digits on the keyboard for the **LOW** limit required for your program.
   5. Press **"ENTER."** The new **LOW LIMIT** value is now stored in RAM memory.

   The new values for **PB, RESET, DEV SET** or **HI/LO LIMITS** are now stored in the MicroTenn II memory. The values must be manually changed if you wish to return to the original values. The original values will be restored if power is momentarily interrupted, unless the **"AUTO RESTART"** switch is in the **"0"** position. (See page 28 for explanation of **"AUTO RESTART."**)

8. **GUARANTEED SOAK**. When the selector switch #3, located on the rear of the MicroTenn (see drawing, pg. 28), is placed in the **"ON"** position, Guaranteed Soak is enabled. In this mode, the program clock is held **"OFF"** until the actual chamber temperature is within the allowable ± deviation of the programmed profile. Once actual temperature is within the preset limits, the clock is turned on and Guaranteed Soak is started. The clock will stop time (turn off) if the actual temperature drifts outside of the preset limits and restart when temperature returns within the preset limits.

BATTERY BACK-UP AND AUTO-RESTART FEATURE

A standard feature of the MircoTenn II is the battery back-up system. This system allows the MircoTenn to retain sufficient data in memory to provide an automatic program restart after a power failure. The battery can maintain memory for up to 5 years. The following conditions must be met before an auto restart will be initiated.

1. The **AUTO-RESTART SELECT SWITCH** located on the rear of the MicroTenn must be in the "0" position (see diagram).

   NOTE: With **SELECT SWITCH** in "0" position,you must manually erase programs step by step to eliminate from RAM memory. Returning the **SELECT SWITCH** to the "1" position and removing power momentarily will automatically erase programs from the RAM memory.

2. With the **AUTO-RESTART** selected, should the main power fail, the following will occur when power is restored.

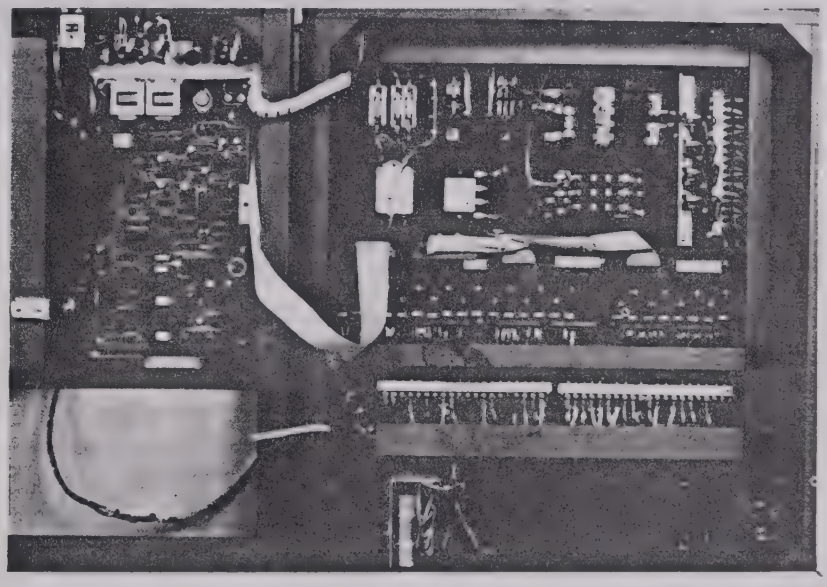
   a. The MicroTenn II will automatically re-load the operating software and perform a self diagnostic test.

   b. The system will re-load the program ID number that was present when power failed.

   c. The program is brought up to the **STEP NUMBER, TIME INTO STEP,** and the **TEMPERATURE** or **TEMPERATURE/HUMIDITY** setpoint that was present when power failed. The MicroTenn II then automatically turns the chamber on and completes the program profile.

   d. The upper display will read "EO-10" indicating **"AUTO-RESTART"** was selected and executed. The lower LCD will display the software I.D. code for your particular chamber.

Inside view of control panel



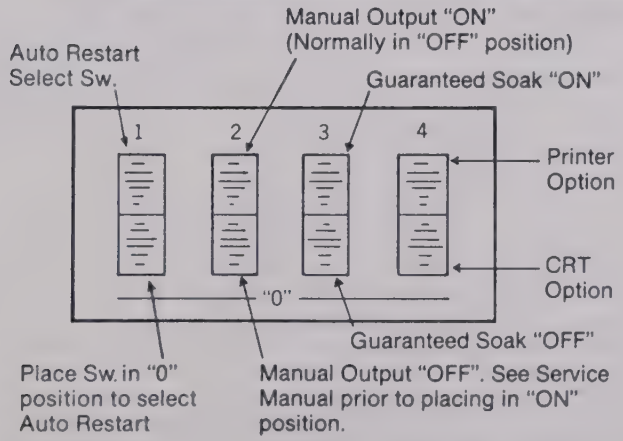
Event Triacs #1-#8

RS-232 Port

Humidity Control Triacs #11-#16

Deviation Alarm Triac #2

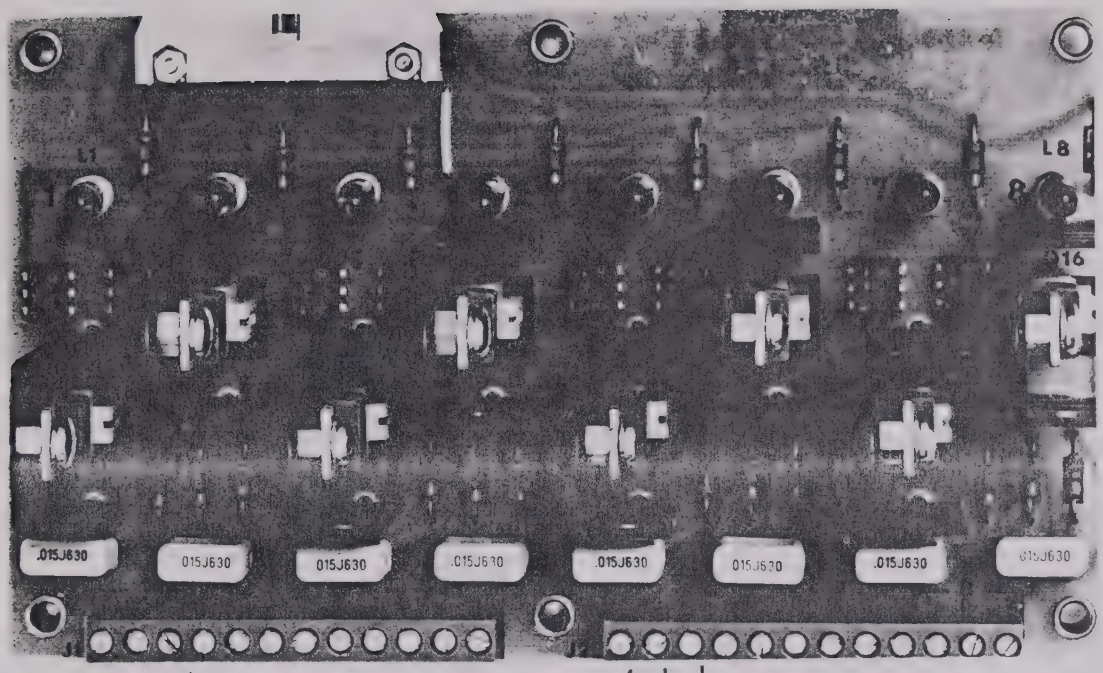
Heating & Refrigeration Control Triacs #1-#10



NOTE

After an **"AUTO-RESTART"** condition, if you wish to monitor actual chamber setpoints, PRESS the center of the **"PROGRAMMER/CONTROLLER"** and the **"CLEAR"** switch to clear the "EO-10" and software I.D. code from the displays.

EVENT TRIAC BOARD



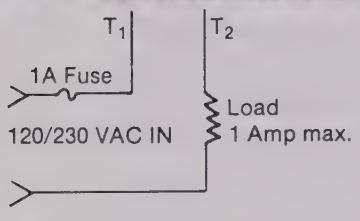


Fig. #1

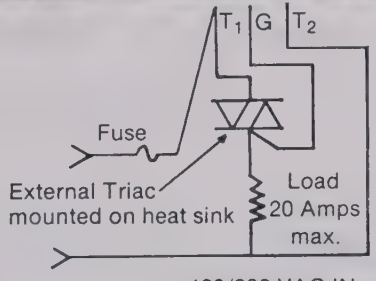


Fig. #2

CONNECTING EVENT TRIACS

Triac Board located behind electrical control panel.(See photo page 28)

When using Event Triacs to control AC loads of 1 Amp or less refer to Fig. #1 wiring diagram. Make sure you install a 1 Amp fuse to prevent damage.

To control larger loads (20 Amps maximum), remove the 1 amp Triac, and connect T_1, G, & T_2 to an external Triac as shown in Fig. #2.

ERROR MESSAGES

The following "E" messages may appear in the Upper Display.

SYSTEM STARTUP "E" MESSAGES

E0-01 System software is loaded. Operator **MUST** manually start system.

E0-02 Battery failed. Operator **MUST** manually start system.

E0-04 The Automatic Restart System failed. The operator **MUST** manually start system.

E0-10 Power failed, and the system performed an Automatic Program Restart.

E0-20 System tried to perform an automatic restart. However no Program Profile was found on the tape.

MEMORY OPERATION "E" MESSAGES

E4-01 Required conditions for Command Cartridge operation have not been met. (Make sure **"OFF"** and **"HOLD"** buttons are pressed)

E4-02 Program ID # requested. Cannot be found in the Command Cartridge library.

E4-04 Program ID # you are trying to enter is already in use.

E4-08 Command library is full. No additional programs can be entered on this side of Command Cartridge.

PROGRAMMING ERROR MESSAGES

E5-01 Illegal segment number encountered.

E5-02 Illegal next step encountered. (NOTE: This message also indicates your Program Profile has completed its run.)

E5-04 Illegal Cycle back to next point encountered.

E5-08 Illegal setpoint value.

E6-01 Hi or Low Limit Alarm activated

HUMIDITY "E" MESSAGE

E7-01 Temperature Setpoints are above or below the humidity operating range of 20° C — 85° C.

TAPE DRIVE "E" MESSAGES

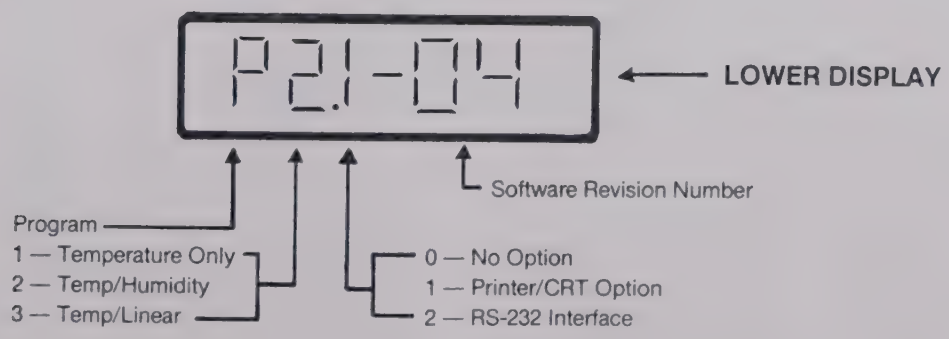
E8-01 Operation aborted due to read error.

E8-02 Operation aborted. Command Cartridge not installed in receptacle.

E8-04 Operation aborted due to a write error or the write protect switch on Command Cartridge is in the **"WRITE PROTECT"** position. (See page 23)

"P" MESSAGES

One of the following "P" numbers will be displayed in the lower LCD after the system completes its 3 min. software load. These "P" numbers are the software code.



CUT HERE

MICROTENN PROGRAM FORM

	HI-LOW LIMIT ALARMS HIGH	HI-LOW LIMIT ALARMS LOW	DEVIATION ALARM	PROPORTIONAL CHAN #1	BAND (PB) CHAN #2	RESET CHAN #1	RESET CHAN #2
CONTROLLER SETTINGS			± _____ °C				

(See Manual for explanation of these settings)

PROGRAM ID # ASSIGNED TO PROGRAM _____ **ENTERED BY** _____ **DATE** _____

Use the following format to enter data for all steps of your program profile. Starting with step #1 thru all 7 entries to next step.

1 ⟶ 2 ⟶ 3 ⟶ 4 ⟶ 5 ⟶ 6 ⟶ 7

ENTER STEP # TO BE PROGRAMMED	ENTER CHAN. #1 TEMP SETPOINT IN °C	ENTER CHAN. #2 DATA IN % RH	ENTER EVENT # TO BE ON IN THIS STEP (1-8 EVENTS)	ENTER STEP TIME HRS: MIN: SEC 18 HRS MAX	ENTER # OF REPEATS REQ. MAX 15	ENTER THE STEP # FOR THE NEXT STEP TO BE PROG.

[redacted] EN[redacted]TEP [redacted] BE PROGRAMMED	[redacted] ENTER CHAN. #1 [redacted]P SE[redacted]NT IN °C	[redacted] ENTER CHAN. #2 DATA IN % RH	EN[redacted]VEN[redacted] BE ON IN THIS STEP (1-8 EVENTS)	[redacted]ER S[redacted]IME HRS: MIN: SEC 18 HRS MAX	[redacted] ENTER # OF REPEATS REQ. MAX 15	[redacted] FOR THE NEXT STEP TO BE PROG.

CUT HERE

MICROTENN PROGRAM FORM

	HI-LOW LIMIT ALARMS HIGH	HI-LOW LIMIT ALARMS LOW	DEVIATION ALARM	PROPORTIONAL BAND (PB) CHAN #1	PROPORTIONAL BAND (PB) CHAN #2	RESET CHAN #1	RESET CHAN #2
CONTROLLER SETTINGS			± _____ °C				

(See Manual for explanation of these settings)

PROGRAM ID # ASSIGNED TO PROGRAM _____ **ENTERED BY** _____ **DATE** _____

Use the following format to enter data for all steps of your program profile. Starting with step #1 thru all 7 entries to next step.

1 ⟶ 2 ⟶ 3 ⟶ 4 ⟶ 5 ⟶ 6 ⟶ 7

ENTER STEP # TO BE PROGRAMMED	ENTER CHAN. #1 TEMP SETPOINT IN °C	ENTER CHAN. #2 DATA IN % RH	ENTER EVENT # TO BE ON IN THIS STEP (1-8 EVENTS)	ENTER STEP TIME HRS: MIN: SEC 18 HRS MAX	ENTER # OF REPEATS REQ. MAX 15	ENTER THE STEP # FOR THE NEXT STEP TO BE PROG.

ENTER STEP # TO BE PROGRAMMED	[redacted] CH [redacted] TEMP SETPOINT IN °C	ENTER CHAN. #2 DATA IN % RH	ENTER EVENT # TO BE ON IN THIS STEP (1-8 EVENTS)	ENTER STEP TIME HRS: MIN: SEC 18 HRS MAX	ENTER # OF REPEATS REQ. MAX 15	ENTER THE STEP # FOR THE NEXT STEP TO BE PROG.

CUT HERE

MICROTENN PROGRAM FORM

	HI-LOW LIMIT ALARMS HIGH	HI-LOW LIMIT ALARMS LOW	DEVIATION ALARM	PROPORTIONAL BAND (PB) CHAN #1	PROPORTIONAL BAND (PB) CHAN #2	RESET CHAN #1	RESET CHAN #2
CONTROLLER SETTINGS			± _____ °C				

(See Manual for explanation of these settings)

PROGRAM ID # ASSIGNED TO PROGRAM _____ **ENTERED BY** _____ **DATE** _____

Use the following format to enter data for all steps of your program profile. Starting with step #1 thru all 7 entries to next step.

1 ⟶ 2 ⟶ 3 ⟶ 4 ⟶ 5 ⟶ 6 ⟶ 7

ENTER STEP # TO BE PROGRAMMED	ENTER CHAN. #1 TEMP SETPOINT IN °C	ENTER CHAN. #2 DATA IN % RH	ENTER EVENT # TO BE ON IN THIS STEP (1-8 EVENTS)	ENTER STEP TIME HRS: MIN: SEC 18 HRS MAX	ENTER # OF REPEATS REQ. MAX 15	ENTER THE STEP # FOR THE NEXT STEP TO BE PROG.

[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
ENTER STEP # TO BE PROGRAMMED	EN[redacted]CHA[redacted] TEMP SETPOINT IN °C	[redacted] [redacted] ENTER CHAN. #2 DATA IN % RH	[redacted]NTER[redacted]NT # BE ON IN THIS STEP (1-8 EVENTS)	EN[redacted] STEP[redacted] HRS: MIN: SEC 18 HRS MAX	[redacted] [redacted] ENTER # OF REPEATS REQ. MAX 15	[redacted] [redacted] ENTER THE STEP # FOR THE NEXT STEP TO BE PROG.

CUT HERE

MICROTENN PROGRAM FORM

	HI-LOW LIMIT ALARMS HIGH	HI-LOW LIMIT ALARMS LOW	DEVIATION ALARM	PROPORTIONAL CHAN #1	BAND (PB) CHAN #2	RESET CHAN #1	RESET CHAN #2
CONTROLLER SETTINGS			± _____ °C				

(See Manual for explanation of these settings)

PROGRAM ID # ASSIGNED TO PROGRAM _____ **ENTERED BY** _____ **DATE** _____

Use the following format to enter data for all steps of your program profile. Starting with step #1 thru all 7 entries to next step.

1 ⟶ 2 ⟶ 3 ⟶ 4 ⟶ 5 ⟶ 6 ⟶ 7

ENTER STEP # TO BE PROGRAMMED	ENTER CHAN. #1 TEMP SETPOINT IN °C	ENTER CHAN. #2 DATA IN % RH	ENTER EVENT # TO BE ON IN THIS STEP (1-8 EVENTS)	ENTER STEP TIME HRS: MIN: SEC 18 HRS MAX	ENTER # OF REPEATS REQ. MAX 15	ENTER THE STEP # FOR THE NEXT STEP TO BE PROG.

ENTER STEP # TO BE PROGRAMMED	ENTER CHAN. #1 TEMP SETPOINT IN °C	ENTER CHAN. #2 DATA IN % RH	ENTER EVENT # TO BE ON IN THIS STEP (1-8 EVENTS)	ENTER STEP TIME HRS: MIN: SEC 18 HRS MAX	ENTER # OF REPEATS REQ. MAX 15	ENTER THE STEP # FOR THE NEXT STEP TO BE PROG.

PLEASE NOTE!

This manual is intended to introduce you to the MicroTenn, its basic programming procedures and operation. A complete MicroTenn manual, including theory of operation, calibration and trouble shooting is included with your MicroTenn equipped chamber.

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